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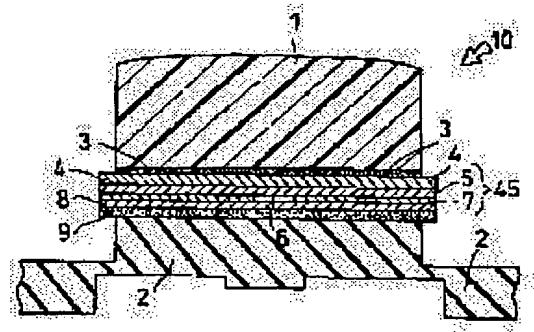
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(54) MEMBER FOR PUSH-BUTTON SWITCH AND ITS MANUFACTURE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a member for a push-button switch, made easy in alteration and revision of design of a display part of the member for a push-button switch, capable of easily adapting to various kinds of information, excellent in artistic design, and sharply improved in visibility.

SOLUTION: This member 10 for a push-button switch is made up by interposing a printed sheet 45 with a display part between a translucent key-top 1 and a translucent rubber cover base material 2 by means of a transparent or semitransparent adhesive 3. In the printed sheet 45, an ink accepting layer is formed on one side of a translucent resin sheet 4, a printed layer 5 is provided by printing the light-transmitting display part on the ink accepting layer by a printer by using minute dots of a plurality of colors, and a light-reflective shading layer 7 of reflectivity not less than 50% having a fixed cutting shape 6 is provided on a lower surface of the printed layer 5, or the light-reflective shading layer 7 and a semitransparent white layer 8 are provided thereon.



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CLAIMS

[Claim(s)]

[Claim 1] The member for a push button switch characterized by considering as the composition characterized by providing the following Translucency keytop The graphic printing layer which is the member for a push button switch which carried out intervention disposition of the printing sheet which has a display through adhesives between translucency rubber covering base materials, a printing sheet forms an ink absorbing layer in the whole surface of a translucency resin sheet, uses the minute dot of two or more colors for this ink absorbing layer, and has a light-transmission nature display is prepared, and it is the light reflex nature shading layer of 50% or more of rates of a light reflex to the undersurface of this printing layer.

[Claim 2] The member for a push button switch characterized by considering as the composition characterized by providing the following Translucency keytop Are the member for a push button switch which carried out intervention disposition of the printing sheet which has a display through adhesives between translucency rubber covering base materials, and a printing sheet forms an ink absorbing layer in the whole surface of a translucency resin sheet. While preparing the graphic printing layer which uses the minute dot of two or more colors for this ink absorbing layer, and has the display of light-transmission nature and preparing the light reflex nature shading layer of 50% or more of rates of a light reflex in the undersurface of this printing layer, it is a translucent white layer to the undersurface of this light reflex nature shading layer.

[Claim 3] The member for a push button switch according to claim 1 or 2 characterized by the bird clapper from the light reflex nature shading layer in which predetermined extracts and a configuration has the aforementioned light reflex nature shading layer.

[Claim 4] Form an ink absorbing layer in one side of a translucency resin sheet, and the graphic printing layer which uses the minute dot of two or more colors for this ink absorbing layer, and has a light-transmission nature display is formed by the printer. While pasting up the translucency keytop which furthermore formed the light reflex nature shading layer of 50% or more of rates of a light reflex in the undersurface of the aforementioned printing layer, manufactured the printing sheet, and was fabricated by the upper surface of this printing sheet by transparency or the translucent resin The manufacture method of the member for a push button switch characterized by pasting up a translucency rubber covering base material on the undersurface of a printing sheet through transparent or translucent adhesives, and considering as the member for a push button switch.

[Claim 5] The manufacture method of the member for a push button switch according to claim 4 characterized by having formed the translucent white layer in the inferior surface of tongue of this light reflex nature shading layer, and considering as a printing sheet manufacturing the aforementioned printing sheet after forming the light reflex nature shading layer of 50% or more of rates of a light reflex in the inferior surface of tongue of the aforementioned printing layer.

[Claim 6] The manufacture method of the member for a push button switch according to claim 4 or 5 characterized by forming the light reflex nature shading layer which predetermined extracts a metal thin film by the technique of hot printing, hot stamping, vacuum evaporation, ion plating, or a SUPPATTA ring, or the metallic printing technique in light reflex nature shading ink although the aforementioned light reflex nature shading layer is formed, and has a configuration in it.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the member for a push button switch used for mobile communication equipment, such as a portable telephone and a car telephone machine, home telephone, an electronic notebook, measuring machine machines, the switch for mount, remote control, a computer, a data entry unit, switching equipment of a personal computer, etc. as parts, and its manufacture method, and relates to the member for a push button switch excellent in the design nature, the visibility, and endurance of a display, such as signs, such as a character, or a pattern, and its manufacture method in detail.

[0002]

[Description of the Prior Art] Generally it sets on push button switches, such as mobile communication equipment, such as a portable telephone, an electronic notebook, a measuring instrument, and remote control. Although constituted as a push button switch which achieves the switch function to which the member for a push button switch with a keytop (covering member) is attached to the circuit board contained in the device case, and opens and closes a circuit This member for a push button switch has many by which many keytops made from plastics are used and a sign or patterns, such as a character, a number, and a sign, are printed if needed. In recent years, there is much what formed the portion of a keytop by the transparent resin, printed signs, such as a character, a number, and a sign, at the rear face of the keytop, protected the printing layer by the keytop, and was further considered as the back light formula push button switch using Light Emitting Diode etc.

[0003] Such a keytop for a push button switch is formed of injection molding, compression molding, cast molding, transfer molding, etc. using hardenability resins, such as transparent thermoplastics, such as polyester, a polycarbonate, an acrylic, and a styrene system, or silicone, urethane, a unsaturated polyester, a vinyl ester, and acrylic. And a sign is formed in the rear face of this keytop by screen-stencil or pad printing. Moreover, the adhesion array of two or more keytops formed in this way if needed is carried out at a rubber covering base material, the pan spring made from polyester, etc., and it is used, being included in a keyboard portion besides a portable telephone.

[0004]

[Problem(s) to be Solved by the Invention] However, if it is in the conventional keytop mentioned above, in order to print directly at the rear face of a keytop, screen printing or pad print processes was performed. however, in this screen printing and pad print processes It is necessary to make the design drawing called block copy according to a printing color in a printing design, and to manufacture this for the screen version or intaglio printing further. And in order to use the printing version of a configuration according to signs (henceforth a sign), such as a character, a number, and a sign, for every color, the same as the color number to be used in the case of process printing — number-of-times printing must be carried out, and time and effort is comparatively [this] lacking also in design nature, and impossible for printing of the clear photograph of high resolution, an illustration, a picture, etc. as a matter of fact Moreover, in small lot multi-form printing, platemaking costs became cost quantity, trouble also started, time for delivery also became long, and there was a problem that design change took time and effort. Since the rear face of a transparent keytop furthermore had printing, when the thickness of a transparent keytop was thick and it was included in a keyboard portion besides a portable telephone, and the position of printing became the back, outdoor daylight was not able to arrive easily and it saw by the reflected light, there was a fault which is visible to the dark somber color and becomes the bad thing of visibility. Moreover, when it was a keytop with the thin thickness of 1mm or less, although visibility was not spoiled, the

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fault that fabrication of the thin keytop itself will be difficult and will become the thing of the bad cost quantity of productivity industrially had it, for example.

[0005] this invention tends to eliminate the trouble of these former, and the design data which used the computer for the design of the display of the member for a push button switch can be used for it, and it is simple also for design change and correction. And since it is the nothing version printing, there is also no cost concerning platemaking and can be simply adapted for variety information. In the conventional screen-stencil, it considers as the high member for a push button switch of the impossible design nature. the high-definition push button switch which furthermore prepares the light reflex nature shading layer of 50% or more of rates of a light reflex in the inferior surface of tongue of this printing layer, and can obtain improvement in the visibility by outdoor daylight, and coloring of a vivid color — it is going to offer a member and its manufacture method [0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention is the member for a push button switch which carried out mediation disposition of the printing sheet which has a display through adhesives between a translucency keytop and a translucency rubber covering base material. A printing sheet forms an ink absorbing layer in the whole surface of a transparent resin sheet. to this ink absorbing layer Two or more colors, For example, the graphic printing layer which has cyanogen, MAZENDA, and the display that consists of the color of light-transmission nature, a pattern, and a sign using the minute dot of three colors of yellow was prepared, the light reflex nature shading layer of 50% or more of rates of a light reflex was prepared in the inferior surface of tongue of this printing layer, and it considered as the member for a push button switch.

(Claim 1)

[0007] And although mediation disposition of the printing sheet which has a display through transparency or translucent adhesives considering as the member for a push button switch concerning this invention between a translucency keytop and a translucency rubber covering base material is carried out and being considered as the member for a push button switch While fabricating the aforementioned keytop by transparent or translucent thermoplasticity or thermosetting resin by the keytop forming cycle The printing stratification process which forms an ink absorbing layer in one side of a translucency resin sheet, and forms the graphic printing layer which uses the minute dot of cyanogen, MAZENDA, and two or more colors of yellow for this ink absorbing layer, and has the display of light-transmission nature by the printer, The shading stratification process of having prepared the light reflex nature shading layer of 50% or more of rates of a light reflex in the inferior surface of tongue of this printing layer, Or the keytop adhesion process of pasting up the keytop which manufactured the printing sheet through this shading stratification process and the translucent white stratification process, and was manufactured by the aforementioned keytop forming cycle on the upper surface of this printing sheet, It considers as the member for a push button switch through the rubber covering base-material adhesion process of pasting up a translucency rubber covering base material on the inferior surface of tongue of a printing sheet through transparent or translucent adhesives. (A claim 2 or claim 6)

[0008] As the aforementioned keytop, acrylic polymer, polycarbonate polymer, or [fabricating with forming equipments, such as injection molding and transfer molding, using styrene polymer and thermoplastics, such as the denaturation polymer,] — or Acrylic resin, an unsaturated polyester resin, a diallyl phthalate resin, A styrene resin, an urethane system resin, a silicone system resin, and its mixture, It considers as the transparent or translucent keytop fabricated with injection molding and cast-molding equipment using thermosetting resin, such as modified resin. Fixing unification is carried out using transparent adhesives, such as heat-curing type adhesives, such as the aforementioned printing sheet, transparent adhesives, for example, acrylic adhesives, polyester system adhesives, and urethane system adhesives, UV hardening type adhesives, and a solvent type adhesive. furthermore, as a resin sheet which forms a printing layer in a printing sheet Translucency resin sheets, such as a polycarbonate system, a polyester system, and an acrylic polymer system, are used. An ink absorbing layer is formed in this. A sublimated type hot printing method or a toner electronic method, An electrostatic picture method, a laser exposure heat developing imprint method, an ink-jet method, Even if there are few hot printing methods and heating coloring methods either, the graphic printing layer which has the display which consists of the color of light-transmission nature, a pattern, and a sign by the minute dot of two or more colors of cyanogen, MAZENDA, and yellow, such as three etc. kinds, is formed using one kind of printer. That is, although a thermoplastics sheet is used for the aforementioned translucency resin sheet, it may consist of amorphia thermoplastics, crystalline thermoplastics, these copolymers, or mixture. A polyethylene terephthalate, polyethylenenaphthalate, a polycarbonate, polypropylene, polyacrylic ester, polystyrene, a polyvinyl chloride, etc. are specifically illustrated, and transparent and colorless, colored transparency, or a translucent

resin sheet is used. In addition, as for this resin sheet, it is good to choose a thing with a thickness [of a polyester system, a polycarbonate system, and the poly acrylic] of 10 micrometers – 500 micrometers from viewpoints, such as a printability. What is necessary is just to form the water absorption layer for making water-soluble ink fix according to the fitness of the printing method that what is necessary is just to form the coating layer of a vinyl chloride vinyl acetate system or a polyester system if it is the acceptance layer of printing ink, for example, sublimated type hot printing printing, if it is ink-jet printing, although a printing layer is furthermore formed in this resin sheet. Furthermore, in order to improve adhesion, it is arbitrary to perform corona discharge, plasma treatment, UV (UV irradiation) processing, priming, etc.

[0009] Since this display is printed by printers, such as a sublimated type, an ink-jet type, an imprinted type, and an electrophotography type, a colorful color, a pattern, a sign, a pattern, etc. are performed at once as color printing using the minute dot of three colors of cyanogen, MAZENDA, and yellow. That is, if it is for example, not the concept of the piled-up lamination but the sublimated type in the case of the so-called multicolored printing which is seen by technique, such as the conventional screen-stencil, a total color will be printed at once by the very thin ink absorption layer of the ink absorbing layer given to the reverse side of a transparent resin sheet per about 0.2mm minute dot from the diameter of 0.01mm. Also in the method of an ink-jet type and others, it is the same. Since it is printing of a dot unit further, it can be said that not ink with deep concentration with concealment nature with strong printing ink but the sign printed by this printing layer, a pattern, etc. are translucencies altogether if it will say strictly (even if black). And since it prints by the printer, for example per three-primary-colors dot, generally printing of a subtle color expression of halftone, gradation, a photograph, graphic design, etc. is possible. Black may be added, in order that cyanogen, MAZENDA, and yellow (henceforth a CMY system) may be used and these three primary colors may emphasize black further. For example, if each three primary colors express the concentration of 256 gradation, a substantial full color expression of 16777216 colors which are the cubes of 256 gradation in three minute dots of a CMY system can be attained, and it can also print by the definition method of a RGB system (red, green, blue) as the three primary colors.

[0010] Furthermore, at the formation process of a printing layer, the color design data which used the computer design method is supplied to printers, such as a sublimated type hot printing method. The very small dot of three colors or **** is used for this in a CMY system or CMYK system ink. Substantial full color printing is performed on a transparent or translucent thermoplastics sheet. Or printing of the light reflex nature shading layer of 50% or more of other rates of a light reflex next, the inferior surface of tongue of this printed resin sheet — predetermined — extracting — a sign and a pattern configuration — it is — Coating, a lamination, hot stamping, vacuum evaporation, a SUPPATTa ring, Constitute a printing sheet using methods, such as plating, or a translucent white layer is further printed on the inferior surface of tongue of this light reflex nature shading layer. After forming by methods, such as coating and a lamination, the position of this printing sheet is made to carry out the fixing unification of the aforementioned keytop and the translucency rubber covering base material through transparent adhesives.

[0011] In addition, although the printing layer in the aforementioned translucency resin sheet exists as an ink absorbing layer, since it is colored in the minute dot unit in the ink absorbing layer, a character and not only a sign but the thing expressing a complicated graphic pattern, a complicated photograph, etc. is possible for actual ink. And since this printing layer is minute dot printing which lets light pass, it is reflected in the light reflex nature shading layer under a printing layer, and let outdoor daylight be the high printing grace of skillful visibility. If the light reflex nature shading layer is used as the metal coat by vacuum evaporation, sputtering, etc. at this time, it will become skillful printing grace with a metallic feeling. Furthermore, a predetermined configuration extracts a light reflex nature shading layer, and it is possible a character and to extract and to form a sign and the so-called Terumitsu Monju who extracts also by the transmitted light of a lower shell and can check a character by looking if it extracts and forms in the pattern etc. Since the layer in which the character extracted from the light reflex nature shading layer at this time, a sign, a pattern, etc. reflect outdoor daylight is lost, although the visibility which appears in outdoor daylight will be inferior a little, if a translucent white layer is formed in the inferior surface of tongue of a light reflex nature shading layer in order to compensate this, visibility can be raised further. The aforementioned printing sheet is the printing sheet of a three-tiered structure, even if have a transparent thermoplastics sheet, a printing layer, and light reflex nature shading layers, such as a shading nature omission character layer, and there is little the composition. moreover, the size as the base of a keytop with the same size of this printing sheet — then, although it was good, it was shown also in drawing — as — the base of a keytop — a few — large — carrying out — a collar — it may constitute in a **, and when the member for a push button switch is included in a sheathing case by doing in this way, in the case

of keytop omission prevention and below-mentioned Terumitsu Monju, positive optical leakage prevention also becomes possible with this printing sheet

[0012] Furthermore, if it becomes the high key of skillful visibility, a predetermined character, a sign, a pattern, etc. extract in a light reflex nature shading layer and a configuration portion is formed by the reflected light of outdoor daylight which will not let the transmitted light pass if a light reflex nature shading layer is formed in the whole surface, it will function as the so-called Terumitsu Monju who extracts with the good visibility of the outdoor daylight reflected light, and is made to a configuration portion letting the transmitted light from the source of luminescence arranged downward pass. If a translucent white layer is furthermore arranged at the rear face of a light reflex nature shading layer, this Terumitsu Monju will fully function also as character illumination, also maintaining the visibility in the reflected light of outdoor daylight good by the translucent white layer.

[0013] moreover — if the coloring layer of the position corresponding to [become the design of the metallic tone with which the whole will shine silver if its attention is paid to a design and a light reflex nature shading layer is constituted from silver leaf or silver ink, and] the silver leaf is red — red — metallically, if it is a gray, it will be metallically alike, and golden, if it is yellow, if it is the gradation of seven colors, carrying out like the rainbow which shines is possible, and the application range This light reflex nature shading layer is not having restricted silver, and it is possible to choose colorful things, such as white of high brightness, a fluorescence color, and a pearl color.

[0014] In addition, as a light reflex nature shading layer attached to the aforementioned printing layer, by the technique of hot printing, hot stamping, plating, vacuum evaporationo, a SUPPATTA ring, etc., predetermined extracts metal thin films (aluminum, chromium, gold, silver, copper, etc.), and they are formed in predetermined omission configurations, such as a character, a sign, and a pattern. Or you may form in a desired pattern configuration etc. light reflex nature shading ink (ink in which it high-fills up with a metal system pigment, the white pigment, the fluorescent dye, the pearl pigment, the mica powder, etc. and which reflects light substantially and does not let light pass) by technique, such as screen-stencil and decalcomania. If especially a metal thin film or metallic printing is used, a special reflected light design expression of a metallic tone will be attained. moreover, the reflected light according [using a light reflex nature shading layer without using a character illumination function] to outdoor daylight — high — if you want only brightness visibility and metallic design expression, it is also possible to extract and to consider as a character and the method which extracts, and does not make it a pattern etc. but laminates a metal thin film and a light reflex nature shading sheet on the whole surface As a suitable example, it is good that the printer of a hot printing formula performs an aluminum vacuum evaporationo film or light reflex nature shading ink like printing of the aforementioned printing layer, and in this case, a printing pattern can make arbitrary patterns easily on a computer, and can carry out [****]-izing also of the printing cost.

[0015] The design made on the computer using such software can be considered as a new design. For example, it is also possible to take in a high-definition scenery photograph and a person photograph, and a precise geometrical pattern can also be drawn. Moreover, since the color number does not have a limit substantially, either, technique, such as not a single color but gradation with which a color changes gradually, also becomes possible for every sign and geometrical pattern. By this, the design flexibility of a keytop can respond to the exterior improvement in added value of increase, the design needs to diversify, and electronic equipment flexibly.

[0016] In addition, using a shading layer as the light reflex nature shading layer of 50% or more of rates of a light reflex in the aforementioned printing sheet is based on the following reasons. That is, it is the coloring which is easy to penetrate light, the reflection factor to outdoor daylight is arranged at the rear face of the keytop of a low sake, especially a push button switch, and after having been covered by the sheathing case of electronic equipment etc., the graphic printing layer which has the display which consists of the color of the light-transmission nature using the minute dot of two or more colors formed by the printing machine, a pattern, and a sign will have little outdoor daylight, will be dark, and will become the bad thing of the Since there is no vividness that especially the rate of a light reflex is 45% or less and it becomes impossible to read in reading ******, by this invention, this problem has been solved there by preparing the light reflex nature shading layer of 50% or more of rates of a light reflex in this printing layer bottom. That is, a transparent keytop and a printing layer are passed and it is reflected in the light reflex nature shading layer of 50% or more of rates of a light reflex of the printing layer bottom, and this light becomes the good thing of bright visibility with the visibly high lightness of the high brightness [layer / printing] as a result of a user, and the light which entered from outside can have it. / seen Consequently, even if it is the push button switch built into the sheathing case of electronic equipment

etc., it can consider as the high thing of the practicality of rich visibility which can be seen clearly by little outdoor daylight.

[0017] Preparing a translucent white layer in the light reflex nature shading layer bottom of a printing sheet next is based on the following reasons. That is, although the portion which forms a light reflex nature shading layer partially, extracts when [so-called] it extracts and considers as a character configuration etc., and hits a character is excellent when seeing as Terumitsu Monju when seeing through the transmitted light with the light from the light source arranged downward namely Since there is little outdoor daylight reflection and it becomes that in which visibility is inferior by the above-mentioned reason when the lower light source is switched off, a translucent white layer functions effectively as that with which the visibility when switching off the light source arranged under this is compensated. In other words, a translucent white layer has the effect which extracts the light of the lower shell at the time of Terumitsu Monju according to through and a white thing, compensates the lightness of a character portion according to a translucent thing, and also raises the visibility by outdoor daylight. The resin sheet colored translucent whites, such as polyester, polypropylene, polyethylene, an acrylic, and a polycarbonate, as the quality of the material of a translucent white layer, the printing ink colored translucent white are used, and, as for such thickness, it is good to be referred to as 0.01 to about 1mm in consideration of a translucent thing. It is simple to laminate and unify, if it is a resin sheet as the formation method, and if it is in an ink state, methods, such as printing, coating, and paint, will be adopted.

[0018] the three-tiered structure in which the printing sheet used for the keytop of this invention has a translucency resin sheet, a printing layer, and a light reflex nature shading layer since it is above — or although considered as the sheet of four layer structures which have a translucency resin sheet, a printing layer, a light reflex nature shading layer, and a translucent white layer, the composition sequence is seen from the side in which a keytop is formed, and needs a light reflex nature shading layer for the printing layer bottom or [in this case, / considering as the sequence of a translucency resin sheet, a printing layer, a light reflex nature shading layer, and a translucent white layer from a top, if it sees as a printing sheet] — or although the case of the sequence of a printing layer, a translucency resin sheet, a light reflex nature shading layer, and a translucent white layer etc. can be considered, it can be chosen from the convenience of a manufacturing process etc. as arbitration about this sequence

[0019] Although it is formed by methods, such as ink printing, coating, paint, a lamination, and hot stamping, since a translucent white layer is given to whole one side of a resin sheet, it is industrially easy and can be formed continuously cheaply here. For example, if it is coating, it is possible to carry out the high-speed application of the white ink by the bar coating machine or the die coating machine, and if it is hot stamping, in time for about 1 second, the stamp of the white can be carried out arbitrarily and it can be formed only in a required portion.

[0020] If the composition and the design of a printing sheet are furthermore explained in detail, for example, will be blue to the whole key of the aforementioned printing layer, and coloring will be performed to it, and suppose that the brown character is formed in the part. The aluminum vacuum evaporationo film of 85% of reflection factors which extract only brown Monju's portion as a light reflex nature shading layer at the rear face of this printing layer, and serve as a character configuration is arranged. Supposing the still more nearly translucent white resin sheet at the rear face of this light reflex nature shading layer laminates For the portion with the whole blue key, it can recognize as a color of the high blue metallic system of the lightness which can also check little outdoor daylight by looking easily by the light reflex of an aluminum vacuum evaporationo film, and the brown character in it is also the light of a translucent white layer. Furthermore, to the light from the bottom, only brown Monju is illuminated through a translucent white resin sheet, and it becomes character illumination, and becomes the high thing of visibility.

[0021] It is also possible to also consider as the design which comes floating in three dimensions, if the hologram ornament is given to this aluminum vacuum evaporationo film, although the light reflex nature shading layer was used as the mere aluminum vacuum evaporationo film in this example, and for it to be possible and to add fine metalworking patterns, such as a hairline, it is not blue and with the silver which is yellow, then an objective color of an aluminum vacuum evaporationo foil, conjointly, a coloring layer is checked by looking as it is golden. Since the high printing sheet of the reflection factor obtained by doing in this way, of course emits many reflected lights even if it pastes a transparent keytop and it is built into electronic equipment, such as a cellular phone and audio equipment, even if they are a little dark places, such as a gloomy room, and the evening, the shady outdoors, it is skillful, and it serves as high printing of visibility, and let it be the practically useful keyboard which can also prevent the fault by the operation mistake etc.

[0022] Furthermore, if it is not necessary to form the light reflex nature shading layer used by this invention in the same profile configuration as the printing sign (for example, character) of a printing layer for example, and the sign of printing and another pattern extract it and the character shading layer is formed, it can also be designed as a kind of watermark character which is not checked by looking most [of / when / this / it extracts and a character pattern is seen by the reflected light], but emerges only when the transmitted light enters. Thus, transparency or translucent adhesives, such as adhesives, for example, a transparent urethane system, an epoxy system, acrylic, a polyester system, and a silicone system, are used for the position corresponding to the printing display of the prepared printing sheet, and adhesion fixation of the keytop is carried out in it, and further, it fixes to the position corresponding to the display of a printing layer at a rubber covering base material, and considers as the member for a push button switch.

[0023]

[Function] The printing sheet with which the member for a push button switch concerning this invention has the printing layer in which displays, such as a sign, were formed, The keytop which consists of the transparent thermoplastics or the transparent hardenability resin prepared in the position corresponding to this display, Have a translucency rubber covering base material and the composition of the aforementioned printing sheet forms an ink absorbing layer in the whole surface of a translucency resin sheet. The minute dot of cyanogen, MAZENDA, and two or more colors of yellow is used for this ink absorbing layer at least. The color of light-transmission nature, The graphic printing layer which has the display which consists of a pattern and a sign is prepared, and predetermined extracts on the inferior surface of tongue of this printing layer. A sign, Since it was characterized by preparing the light reflex nature shading layer of 50% or more of rates of a light reflex with a pattern configuration and the printing display was formed in the resin sheet by the printer By being able to be adapted for variety design formation information, being able to consider as the member for a push button switch containing the outstanding keytop suitable for highly minute and highly precise full color small lot many forms, and moreover forming a light reflex nature shading layer in the rear face of a printing layer Lightness and saturation can respond also to the special ornament which the display excellent in good visibility was formed, and used metallic one, a hologram, an on-the-spot photo photograph, CG (CG), etc. abundantly easily, and can be considered as the high goods design of the user appeal force. In addition, since a printing portion is covered with a transparent keytop, the endurance which did not wear a printing display out on the occasion of use, and was excellent in the display, i.e., the visibility which was excellent over the long period of time, is held.

[0024] Moreover, since the design designed on the computer can reflect the manufacture method of the member for a push button switch concerning this invention in a printing display, without passing through processes, such as platemaking, high-definition printing is obtained and printing is moreover formed in a translucency resin sheet, compared with the case where it prints to mold goods etc., it can be easy, and can make cheaply, and a white or silver coloring layer can also be formed easily industrially. That is, it is not concerned with an abundant article and small lot article, but the manufacturing cost can be cut down sharply.

[0025]

[Embodiments of the Invention] Hereafter, the gestalt of implementation of this invention is explained using a drawing. Drawing 1 shows one operation gestalt of this invention, and the member 10 for a push button switch is considered as the composition which arranged the printing sheet 45 which has the translucency keytop 1 and the light reflex nature shading layer 7 which the printing layer 5 which has a display in the resin sheet 4 through transparency or the translucent adhesives 3 and 9, and predetermined extract, and has a sign between the translucency rubber covering base materials 2. It has the keytop forming cycle 11 fabricated with metal mold 30, and it is shown in drawing 2 and drawing 3 — as — transparent or translucent thermoplasticity or thermosetting resin — the aforementioned keytop 1 — fabrication — An ink absorbing layer is formed in one side of the transparent resin sheet 4. to this ink absorbing layer Moreover, a sign, A pattern and the printing stratification process 12 which prints the display which consists of color by the printer 20 which contains the original design input device 21 using the minute dot of two or more colors, and is used as the printing layer 5, Pass the light reflex nature shading stratification process 13 which forms in the inferior surface of tongue of the printing layer 5 the light reflex nature shading layer 7 which extracts corresponding to the sign and pattern configuration which were printed by the aforementioned printing layer 5, and has a configuration 6. Although it has the process which forms the translucent white layer 8 in the inferior surface of tongue of this light reflex nature shading layer 7, and is used as the printing sheet 45 and the keytop 1 manufactured by the aforementioned keytop forming cycle 11 is pasted up on the upper surface of this printing sheet 45 The keytop adhesion process 14 which applies adhesives 3 by the precision dispenser and carries out fixing unification with the UV irradiation means 40, The

member 10 for a push button switch is manufactured from the rubber covering base-material adhesion process 16 of pasting up the translucency rubber covering base material 2 on the inferior surface of tongue of the printing sheet 45 with the transparent or translucent adhesives 9.

[0026] In this case, although the composition of the printing sheet 45 containing the aforementioned printing layer 5 is the sequence of the transparent resin sheet 4, the printing layer 5, the light reflex nature shading layer 7 that extracts and has a configuration 6, and the translucent white layer 8 from the top Like other forms of this invention, the composition of the printing sheet 45 may make it from a top the order of the printing layer 5, the resin sheet 4, the light reflex nature shading layer 7 that extracts and has a configuration 6, and the translucent white layer 8. In any case, in order that the printing layer 5 may have a sign, a photograph, a full color geometrical pattern, etc., may be printed and may raise the visibility according to design data, the light reflex nature shading layer 7 is formed in the printing layer 5 bottom. Moreover, what is necessary is to extract and just to consider as the light reflex nature shading layer of a character configuration, when illuminating only a character by the back light.

[0027] As the aforementioned light reflex nature shading stratification process 13, the metal thin film of 50% or more of rates of a light reflex is laminated. The technique of hot printing, hot stamping, vacuum evaporation, ion plating, or a SUPPATT A ring, or the metallic printing technique in light reflex nature ink of 50% or more of rates of a light reflex, The light reflex nature shading layer 7 which predetermined extracts and has configurations, such as a sign and a pattern, by paint, coating, etc. can be formed, and polymerization formation of the translucent white layer 8 can also be carried out further at this light reflex nature shading layer 7.

[0028] Moreover, the keytop cutting process 15 which was pasted up on the aforementioned printing layer 5 and which is cut by the carbon dioxide laser 50 for every keytop and the process which pastes up the keytop 1 separately cut according to this keytop cutting process 15 on the rubber covering base material 2 fabricated with translucency SHIRIN contest rubber by the adhesives 9 of a transparent or translucent adhesion double-sided tape are also included in the aforementioned rubber covering base-material adhesion process 16. Of course, it is also possible for the keytop cutting process 15 not to be limited to a carbon dioxide laser, to keeps being based on a punching edge, and to consider as processing, and before sticking a keytop 1, you may cut the printing sheet 45 beforehand here. Moreover, although the keytop forming cycle 11 shown in drawing 2 (a) is cast molding which used the resin made from heat curing, in the case of thermoplastics, generally, an injection-molding method is used.

[0029] In addition, a reinforcement film can also be fixed if needed to the background of the rubber covering base material 2 corresponding to the transparent keytop 1 of the aforementioned member 10 for a push button switch. Moreover, the member 10 for a push button switch is attached with the circuit board through a click board etc., and is held in casing, such as a portable telephone, the amount of [of the transparent keytop 1] point projects it to a press operational out of casing, and it presses the dome section of a click board by press operation, contacts the traveling contact of the dome section to the stationary contact of the circuit board, and although illustration is omitted, as it opens and closes a circuit, it can also be used.

[0030] Although the sign according to the function of a key etc. is arranged and printed in the example of a design of the aforementioned printing layer 5, it can arrange to freedom, such as a photograph, CG, and a high precision geometrical pattern, in fact. Moreover, since the light reflex nature shading layer 7 is formed in the background of a printing layer even when considering as character illumination, it is not necessary to make the periphery of a character into the black of a dark color system etc. like before, and the design of free coloring is possible. For example, it can consider as Terumitsu Monju to whom only the portion of a character penetrates the character which colors it a very thin color, extracts the periphery of a character, and is made into a character to the light of a lower shell since a shading layer is formed in the background of a periphery portion also as a color deeper than this. Moreover, the light reflex nature shading layer 7 does not need to extract, and it is not necessary to necessarily make a configuration 6 the same as the character configuration of the printing layer 5 for example, and extracts, and a configuration 6 can be made into a somewhat larger configuration, or it can respond to designs possible [also making it the shape of a fine mesh], and various.

[0031] Next, by the manufacture method of this invention, if required for the resin sheet 4 made of thermoplastics, surface treatment for printing will be performed. If it illustrates, plasma treatment for the improvement in adhesion, corona discharge, priming, etc. will be performed, and an ink absorbing layer, an ink absorption layer, or an ink glue line for next making the ink of a printer 20 adhere etc. is coated with a coating machine. Next, while printing the printing layers 5, such as a predetermined sign used for a keyboard by the printer 20, on this resin sheet 4 Form the translucent white layer 8 in the thing which formed the light reflex

nature shading layer 7 which extracts and has a configuration 6, or a pan at this, and it considers as the printing sheet 45. The fixing unification of the transparent keytop 1 is carried out through the adhesives 3 transparent on this printing sheet 45, and under the printing sheet 45, the rubber covering base material 2 is really fixing-ized with adhesives 9, and it considers as the member 10 for a push button switch. (Drawing 1) The aforementioned translucent white layer 8 may be formed by methods, such as printing, hot stamping, and coating, may prepare a white sheet, and may laminate this.

[0032] And although the aforementioned keytop 1 is fabricated by injection fabrication, cast molding, etc. using resin material, as for the background of a keytop 1, i.e., the field which pastes up the printing sheet 45, it is desirable [the keytop] that it is a flat side as much as possible for the sake of the convenience which pastes up the above-mentioned printing sheet 45. Thus, it fixes to the position of the above-mentioned printing sheet 45 through the transparent adhesives 3, the prepared transparent keytop 1 is further fixed on the rubber covering base material 2, and the member 10 for a push button switch is obtained. This member 10 for a push button switch is attached to the circuit board, and constitutes the push button switch which is attached with the circuit board, is held in casing, such as composition, i.e., a portable telephone etc., and uses a switch for a telephone number input etc.

[0033] As mentioned above, colorful design printing can realize the gestalt of this operation easily, visibility of the keyboard arranged in the position where the evening, the cloudy outdoors, the gloomy room, and the case extended far back by the light reflex nature shading layer improves sharply, lightness and saturation are also high and, moreover, structure can fabricate the member for a push button switch easily. For this reason, the manufacturing cost of the member for a push button switch containing the keytop which was rich in design nature can be reduced, and the member for a push button switch of an illumination formula or a reflective formula can also be manufactured cheaply, and it can be coped with flexibly, without increasing cost, even if it is small lot multi-form manufacture. And it unites with a keytop rear face, and a printing display is excellent also in the visibility of a display, and, as for the manufactured member for a push button switch, does not produce display wear, either, and high endurance is acquired.

[0034] Since there is no light reflex nature shading layer 7 conversely when the light of the light source is not always lighting and the printing layer 5 of the portion switches off the light of the light source although lightness and saturation serve as bright good visibility since the light reflex nature shading layer 7 extracts in the case of Terumitsu Monju and the light from the light source arranged at the bottom can check it by looking through a configuration 6, it becomes that in which visibility was inferior a little. In order to solve this, the translucent white layer 8 is formed. the light passing and spoiling the function as Terumitsu Monju, when the light source arranged at the bottom is on, since the translucent white layer 8 is translucent — or since it has colored white, the lightness of the color formed in the printing layer 5 can be raised, and visibility when the light source has gone out can also be raised Although it is laminating a white resin sheet with the translucent composition method, or printing using translucent white ink etc., if it is the former, the thing of 5-500-micrometer thickness, such as a polyester sheet of translucent white, a polycarbonate sheet, and an acrylic sheet, is chosen. If it is the latter, it will be formed by methods, such as screen-stencil, using white ink.

[0035] As transparency or translucent adhesives 9, it is for making it paste up with the translucency rubber covering base material 2. Although anythings may be usable as long as it is adhesives, and you may originally be opaque colored adhesives as long as it does not consider as an illumination key type further Using the double-sided tape which used the ** acrylic binder in the example, the flash of adhesives, and in the device by which it hangs down, and is uniform and recently was thin-shape-ized, it has considered so that it may not become an obstacle, and it can consider as high-definition adhesion.

[0036] As the aforementioned rubber covering base material 2, two or more keytops 1 are arranged and the position of the rubber covering base material 2 is pasted. Although the covering base material made of silicone rubber, the covering base material made from EPDM, the covering base material made from thermoplastic elastomer, etc. are used, especially when choosing the covering base material made of silicone rubber, in order to raise adhesion reliability, it is desirable [this rubber covering base material 2] to perform surface treatment of silicone rubber. As surface treatment, corona discharge, UV washing, EB irradiation, a flame treatment, a coupling agent, or a primer application is used. With the gestalt of this invention, after carrying out UV washing processing of the front face of silicone rubber, a silane coupling agent is applied and adhesive strength is increased.

[0037] In the operation gestalt of drawing 4 , the printing sheet 45 arranged between a keytop 1 and the rubber covering base material 2 consists of the resin sheet 4, a printing layer 5, and a light reflex nature shading layer 7

that extracts and has a configuration 6, and fixing unification is carried out with adhesives 3 and the adhesives 9 of a double-sided adhesion sheet.

[0038] if it is the modification of the example of drawing 1 and it is what the light reflex nature shading layer 7 of the printing sheet 45 has arranged partially, and silver leaf etc. is used and it will see by the reflected light with the operation gestalt of drawing 5 — a portion — if it is checked by looking as metallic and sees by the transmitted light, conversely, only the portion of the light reflex nature shading layer 7 does not let light pass, but can be used as a periphery illumination key

[0039]

[Example] Next, the example of this invention is explained.

The transparent keytop with a height of 2mm was fabricated by example 1 every direction abbreviation 6mmx8mm by the 100 usual injection fabricating methods using the thermoplastic polycarbonate resin (tradename : NOVAREX 7020 IR) by Mitsubishi Kasei Corp. Moreover, the predetermined printing pattern was formed in the 125-micrometer transparent PET sheet as a printing layer, using SEIKO EPSON color laser printer LP-8000C as a printing sheet. A sign, color, the pattern, etc. are printed by the graphic of the dot unit for which this printing used the three-primary-colors color toner. Next, the light reflex nature shading layer was formed in the printing side of this printing sheet using the vacuum deposition technique using the aluminum-gold group. At this time, the thickness of an aluminum vacuum evaporationo layer was changed from 30A to 300A, and five kinds of things to which the rate of a light reflex of a light reflex nature shading layer was changed from 30% to 90% as shown in Table 1 as a result were prepared. the next — UV adhesives (tradename : uni-DIKKU V-4221) by Dainippon Ink & Chemicals, Inc. — as a curing agent — the product made from a tiba guy key — the background of the aforementioned keytop and the PET sheet side (side which is not printed) of a printing sheet were pasted up with the adhesives which blended IRUGAKYUA #184 [2.4-section] (Adhesion conditions : high-pressure mercury a 80W [/cm] column, 10cm of distance 10-second irradiation) Thus, the keytop with a printing sheet was manufactured. Moreover, the translucency rubber covering base material which uses 0.8 ***** material for silicone rubber KE-151u by Shin-Etsu Chemical Co., Ltd. for vulcanizing agent C-8A of the company, and can, on the other hand, arrange the keytop for 15 pieces with heating compression molding as a rubber covering base material was fabricated. The adhesion front face of this rubber covering base material Next, the wavelength of 185nm, and 254nm, After performing irradiation for about 1 minute using the UV irradiation equipment of output 40W and making an adhesion front face pure, What clipped the adhesive tape (tradename : DAKKU liner tangent line- 250) by LINTEC Corp. in the almost same configuration as an adhesion side was stuck on this adhesion side, the adhesion unification of the aforementioned keytop with a printing sheet was carried out, and the mold goods of the member for a push button switch were obtained. thus, the obtained member for a push button switch — the case of a cellular phone — incorporating — an indoor luminosity (600 luxs) — setting — measuring instrument:TOPCON Make — when the illumination photometry of a key portion was carried out by BM-7 and visibility was evaluated, it became as it is shown in Table 1 Thus, printing of a printing sheet can check skillfully the mold goods of the obtained numbers 3, 4, and 5 by looking through a transparent keytop, and further, since this printing is graphical pattern printing with a warm dot unit, its screen-stencil is different and minute, they are the things of the quality near the photograph of an infinite color substantially, and are high-definition. Moreover, although included in cases, such as a cellular phone, it reflected by little outdoor daylight and legible grace was high. Although it was visible when the mold goods of numbers 1 and 2 hit the light from sufficient outside as compared with this, when it included in a cellular phone at a case, outdoor daylight was lacking, and it became the printing visibility which lacks in the visibility which is especially hard to read.

[0040]

[Table 1]

反射性遮光層の視認性

番号	反射性遮光層 アリ:蒸着厚み	光反射率	照度測定結果		視認性評価結果
1	30Å	30%	0.5cd/m ² 以下	×	明度が低く数字がよみとれない
2	80Å	45%	0.8cd/m ²	×	見えるものの鮮やかでなく読みとりづらい
3	100Å	50%	1.0cd/m ²	○	ケースに組まれた状態でも良好に見える
4	150Å	70%	2.0cd/m ²	○	細かな色も判別でき鮮やかに見える
5	300Å	90%	3.0cd/m ²	○	メタリックが強調され鮮やかである

[0041] The transparent keytop with a height of 2mm was blended 1% as a curing agent using the thermosetting unsaturated-polyester system resin (tradename : Ester C755-1) by Mitsui Chemicals, Inc. by example 2 every direction abbreviation 6mmx8mm, and par hexa 3M by Nippon Oil & Fats Co., Ltd. were fabricated with 15 casting hot forming (170-degree-C 5 minutes). Moreover, the predetermined printing pattern was printed on the 125-micrometer transparent PET sheet, using the sublimated type hot printing color printer TruePrint3500 by Victor Co. of Japan, Ltd. as a printing sheet. The sign, the pattern, etc. are printed by the graphic of the dot unit for which this printing used CMYK color sublimation ink. Next, hot printing printing was given [printing which predetermined extracts to the printing side of a printing sheet as a light reflex nature shading layer, and has a portion in it] to the predetermined pattern for the aluminum vacuum evaporationo foil (tradename by Victor Co. of Japan, Ltd. : platinum silver ink JP-T3201) by the sublimated type hot printing color printer TruePrint3500 by Victor Co. of Japan, Ltd. The reflection factor of the light reflex nature shading layer at this time was 60%. And the sticking-by-pressure lamination of the white PET sheet by Toray Industries, Inc. and the tradename lumiler X-20 (50 micrometers) was carried out through acrylic adhesives on the whole surface at the side which printed this light reflex nature shading layer that extracts and has a character portion as a translucent white layer. Furthermore, the background of the aforementioned keytop and the PET sheet side (side which is not printed) of a printing sheet were pasted up with UV adhesives (tradename : diamond bond UV-147) of Make [chemical / NOGAWA]. (15cm of distance [Adhesion conditions :] high-pressure-mercury-vapor-lamp 80 W/cm, 30-second irradiation) Thus, 15 keytops with a printing sheet were manufactured in all. Moreover, the translucency rubber covering base material which can, on the other hand, arrange the keytop for 15 pieces with heating compression molding as a rubber covering base material using the material which blended 0.8 sections vulcanizing agent C-8A of the company with silicone rubber KE-151u by Shin-Etsu Chemical Co., Ltd. was fabricated. Next, after performing irradiation for about 1 minute for the adhesion front face of this rubber covering base material using the wavelength of 185nm, and the UV irradiation equipment of 254nm and output 40W and making an adhesion front face pure, the little application of the primer KE-1800C by Shin-Etsu Chemical Co., Ltd. was carried out, and this adhesion side was air-dried. Next, using what clipped the adhesive tape made from Hitachi Chemical Polymer (tradename : Highbon 11-583) in the almost same configuration as an adhesion side, in order to paste up a keytop with a printing sheet, and a rubber covering base material and to raise an adhesive property further, the dryer performed 100-degree-C heating for 30 minutes, and the mold goods of the member for a push button switch were obtained. Thus, printing of a printing sheet can check the obtained mold goods by looking skillfully through a transparent keytop, and further, since this printing is graphical pattern printing with a warm dot unit, its screen-stencil is different and minute, they are the things of the quality near the photograph of an infinite color substantially, and are high-definition. And since it was metallic, it extracted and the character configuration was formed, when [at which these printings shine by the light reflex nature shading layer of the aluminum vacuum evaporationo foil arranged at the rear face] the lighting from a rear face is received, it penetrates partially [light] and alternatively, and it keeps being based on the transmitted light, and has become mold goods with good character and visibility which is extracted and patterns, such as a sign, can check by looking lucidly.

The transparent keytop with a height of 2mm was fabricated by example 3 every direction abbreviation 6mmx8mm by the 15 usual injection fabricating methods using the thermoplastic polycarbonate resin (tradename : NOVAREX 7020 IR) by Mitsubishi Kasei Corp. Moreover, the predetermined printing pattern was

fabricated as a printing layer on the 200-micrometer transparent PET sheet, using the sublimated type hot printing color printer TruePrint3500 by Victor Co. of Japan, Ltd. as a printing sheet. As for this printing, the sign, the pattern, etc. are printed in CMY system color sublimation ink. Next, in the printing side of a printing sheet, the acrylic binder was used, RUMIKURU 1015 film by LINTEC Corp. of 55% of reflection factors was laminated as a light reflex nature shading layer, and it formed in one. Furthermore, the background of the aforementioned keytop and the PET sheet side (side which is not printed) of a printing sheet were pasted up on UV adhesives (tradename : uni-DIKKU V-4221) by Dainippon Ink & Chemicals, Inc. with the adhesives which blended IRUGAKYUA #184 [3.0-section] made from a tiba guy key as a curing agent. (10cm of distance [Adhesion conditions : high-pressure mercury a column] 80 W/cm, 10-second irradiation) Thus, the keytop with a 15-piece printing sheet was manufactured in all. Moreover, on the other hand, the translucency rubber covering base material which can arrange the keytop for 15 pieces with heating compression molding was fabricated as a rubber covering base material using the material which blended 1.0 sections vulcanizing agent C-8A of the company with silicone rubber KE-151u by Shin-Etsu Chemical Co., Ltd. The adhesion front face of this rubber covering base material Next, the wavelength of 185nm, and 254nm, After performing irradiation for about 1.5 minutes using the UV irradiation equipment of output 40W and making an adhesion front face pure, What clipped the adhesive tape (tradename : DAKKU liner tangent line- 250) by LINTEC Corp. in the almost same configuration as an adhesion side was stuck on this adhesion side, the adhesion unification of the aforementioned keytop with a printing sheet was carried out, and the mold goods of the member for a push button switch were obtained. Thus, the obtained mold goods can check printing of a printing sheet by looking through a transparent keytop, and further, this printing of screen-stencil is different and minute, and is the thing of the quality near a photograph, and they are high-definition. And by the light reflex nature shading layer arranged at the rear face, when the lighting from a rear face is received, light is the mold goods with good visibility which can be lucidly checked by looking by the pattern by the transmitted light around a shading layer. [0042]

[Effect of the Invention] In this invention, can use the design data which used the computer for the design of the display of a keytop, and design change and correction are easy. And since it is the nothing version printing, there is also no cost concerning platemaking and a print speed and a system are remarkably good. While it can be simply adapted for variety design formation information and being able to consider as the high member for a push button switch of the impossible design nature in conventional screen-stencil and conventional pad printing Since a those [with possible] and light reflex nature shading layer forms apart from [light neutral colors are also possible for the color of a printing layer itself, and / the printing method of a dot unit, then an expression full color on a real target] this using a minute dot color For example, the high shading layer of the reflection factor of the deep white high-filled up with the shading layer and white pigment of an aluminum vacuum evaporation foil can be formed. Can maintain printing of rich design nature which does not spoil expression of a full color printing layer by this, and Since visibility improves sharply, lightness and saturation are also high, high-definition reappearance of a clear photograph, an illustration, a picture, etc. is moreover possible for them and there is no limit also in the color number, when a light reflex nature shading layer furthermore has 50% or more of rate of a light reflex, The flexibility of a design can consider as the new design from which it is not obtained by increase and the conventional method, and it is made at the member for a push button switch which was rich in design nature, and the manufacturing cost can also be reduced, and also it can be coped with flexibly, without increasing cost, even if it is small lot multi-form manufacture. And it unites with a transparent key resin section rear face, and a printing display is excellent also in the visibility of a display, and, as for the manufactured member for a push button switch, does not produce display wear, either, and high endurance is acquired. Furthermore, if the light reflex nature shading layer of the display of a push button switch extracts and the profile of a configuration and the profile of printings, such as a character pattern of a printing layer, are doubled It is also possible to consider as the composition which can check by looking the display which is different, respectively when a key is seen by the reflected light, and when a key is seen by the transmitted light, if a Terumitsu Monju type is obtained, it keeps differing from the pattern of a printing layer and the character pattern is made. Since it can consider as the colorful member for a push button switch which was rich in design nature and printing is formed in a translucency resin sheet Compared with the case where it prints to mold goods etc., it can make cheaply simply in large quantities, and large improvement in productivity can be aimed at, and also it is not concerned with an abundant article and small lot article, but the manufacturing cost can be cut down sharply.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the enlarged vertical longitudinal sectional view of the member for a push button switch concerning the gestalt of operation of this invention.

[Drawing 2] Some outlines of the manufacturing process of this invention are shown, (a) shows a keytop forming cycle and (b) shows a printing stratification process.

[Drawing 3] It is the ** type view showing the outline of the manufacturing process of this invention in an alphabetical order.

[Drawing 4] It is the enlarged vertical longitudinal sectional view of other operation gestalten of this invention.

[Drawing 5] It is the enlarged vertical longitudinal sectional view of the operation gestalt of further others of this invention.

[Description of Notations]

- 1 Keytop
- 2 Rubber Covering Base Material
- 3 Adhesives
- 4 Resin Sheet
- 5 Printing Layer
- 6 Extract and it is Configuration.
- 7 Light Reflex Nature Shading Layer
- 8 Translucent White Layer
- 9 Adhesives
- 10 Member for Push Button Switch
- 11 Keytop Forming Cycle
- 12 Printing Stratification Process
- 13 Light Reflex Nature Shading Stratification Process
- 14 Keytop Adhesion Process
- 15 Keytop Cutting Process
- 16 Rubber Covering Base-Material Adhesion Process
- 45 Printing Sheet

[Translation done.]

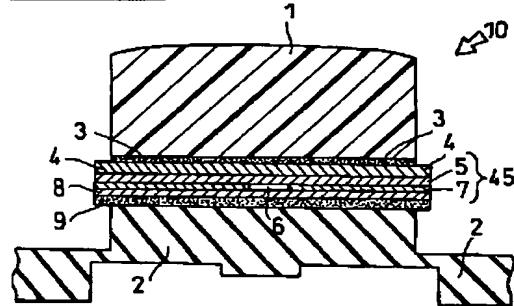
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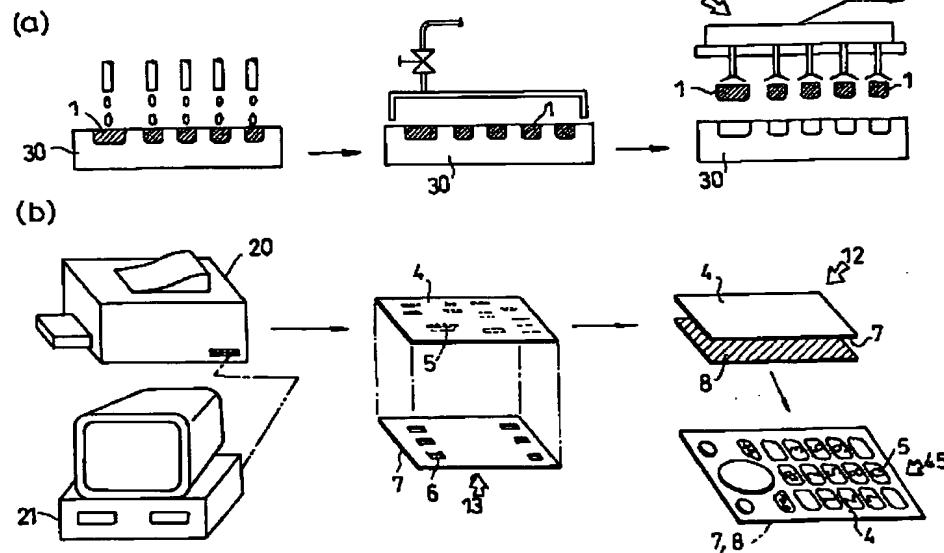
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DRAWINGS

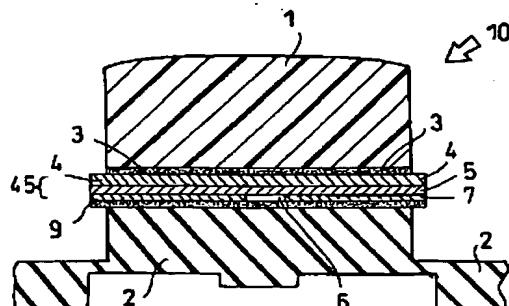
[Drawing 1]



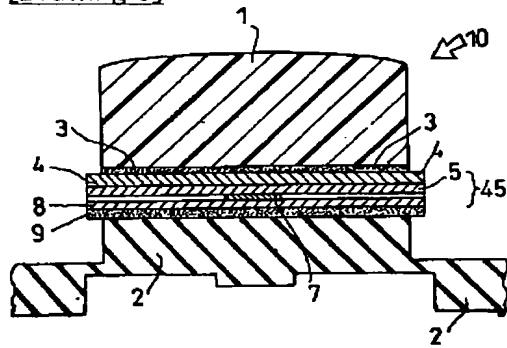
[Drawing 2]



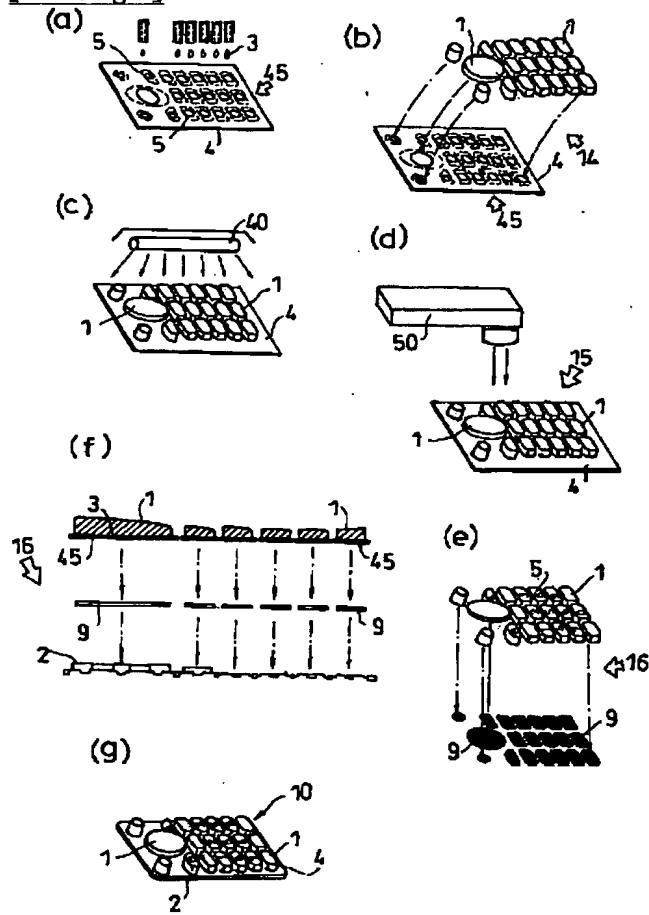
[Drawing 4]



[Drawing 5]



[Drawing 3]



[Translation done.]

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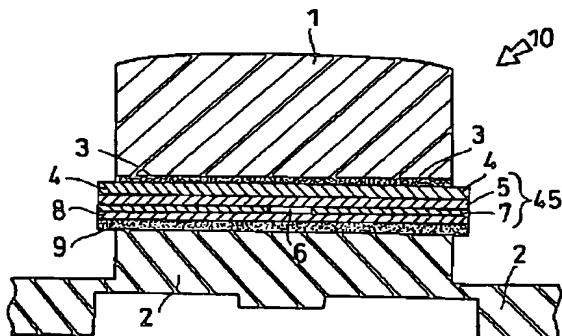
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(54)【発明の名称】 押釦スイッチ用部材およびその製造方法

(57)【要約】

【課題】 押釦スイッチ用部材の表示部のデザインの変更、修正が簡単で、簡易に多種情報に適応でき、意匠性が高く視認性も大幅に向上去できる押釦スイッチ用部材を低コストで提供する。

【解決手段】 透光性キートップ1と、透光性ゴムカバー基材2との間に透明または半透明接着剤3を介して表示部のある印刷シート45を介在配備した押釦スイッチ用部材であって印刷シート45は、透光性樹脂シート4の片面にインク受容層を形成し、該インク受容層に複数色の微小ドットを用いて光透過性表示部をプリント20により印刷して印刷層5を設け、該印刷層5の下面に所定の抜き形状6のある光反射率50%以上の光反射性遮光層7または該光反射性遮光層7と半透明白色層8を設けて押釦スイッチ用部材10とした。



【特許請求の範囲】

【請求項1】 透光性キートップと、透光性ゴムカバー基材との間に接着剤を介して表示部のある印刷シートを介在配備した押釦スイッチ用部材であって、印刷シートは透光性樹脂シートの一面にインク受容層を形成して、該インク受容層に複数色の微小ドットを用いて光透過性表示部を有するグラフィック印刷層を設け、該印刷層の下面に光反射率50%以上の光反射性遮光層を設けた構成としたことを特徴とする押釦スイッチ用部材。

【請求項2】 透光性キートップと、透光性ゴムカバー基材との間に接着剤を介して表示部のある印刷シートを介在配備した押釦スイッチ用部材であって、印刷シートは透光性樹脂シートの一面にインク受容層を形成して、該インク受容層に複数色の微小ドットを用いて光透過性の表示部を有するグラフィック印刷層を設け、該印刷層の下面に光反射率50%以上の光反射性遮光層を設けると共に、該光反射性遮光層の下面に半透明白色層を設けた構成としたことを特徴とする押釦スイッチ用部材。

【請求項3】 前記光反射性遮光層が所定の抜き形状のある光反射性遮光層からなることを特徴とする請求項1または請求項2記載の押釦スイッチ用部材。

【請求項4】 透光性樹脂シートの片面にインク受容層を形成し、該インク受容層に複数色の微小ドットを用いて光透過性表示部を有するグラフィック印刷層をプリントにより形成し、さらに前記印刷層の下面に光反射率50%以上の光反射性遮光層を形成して印刷シートを製作し、該印刷シートの上面に透明または半透明白色樹脂で成形された透光性キートップを接着すると共に、印刷シートの下面に透明または半透明の接着剤を介して透光性ゴムカバー基材を接着して押釦スイッチ用部材とすることを特徴とする押釦スイッチ用部材の製造方法。

【請求項5】 前記印刷シートを製作するのに、前記印刷層の下面に光反射率50%以上の光反射性遮光層を形成したのち、該光反射性遮光層の下面に半透明白色層を形成して印刷シートとしたことを特徴とする請求項4記載の押釦スイッチ用部材の製造方法。

【請求項6】 前記光反射性遮光層を形成するのに、金属薄膜を熱転写、ホットスタンプ、蒸着、イオンプレーティングまたはスッパッタリングの手法或いは光反射性遮光インキによるメタリック印刷手法によって所定の抜き形状を有する光反射性遮光層を形成することを特徴とする請求項4または請求項5記載の押釦スイッチ用部材の製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、携帯電話機、自動車電話機等の移動体通信機器、家庭用電話機、電子手帳、計測機器類、車載用スイッチ、リモコン、計算機あるいはパーソナルコンピュータのデータ入力装置やスイッチ装置等に部品として用いられる押釦スイッチ用部材

およびその製造方法に係り、詳しくは、文字などの記号あるいは図柄等の表示部のデザイン性と視認性と耐久性に優れた押釦スイッチ用部材およびその製造方法に関するものである。

【0002】

【従来の技術】 一般に、携帯電話機等の移動体通信機器、電子手帳、計測器、リモコンなどの押釦スイッチにおいては、キートップのある押釦スイッチ用部材（カバー部材）が機器ケース内に収納された回路基板に組み付けられて、回路を開閉するスイッチ機能を果たす押釦スイッチとして構成されるものであるが、この押釦スイッチ用部材は、プラスチック製のキートップが多く使われ、必要に応じて文字、数字、符号等の記号或いは図柄が印刷されているものが多い。近年においては、キートップの部分を透明樹脂で形成し、そのキートップの裏面に文字、数字、符号などの記号の印刷を施して印刷層をキートップで保護し、さらにLEDなどを用いたバックライト式押釦スイッチとしたものも多い。

【0003】 このような、押釦スイッチ用のキートップは、ポリエチル、ポリカーボネート、アクリル、スチレン系等の透明熱可塑性樹脂またはシリコーン、ウレタン、不飽和ポリエチル、ビニルエチル、アクリル系等の硬化性樹脂を用いて射出成形、圧縮成形、注型成形、トランク成形等により形成される。そして、このキートップの裏面に記号をスクリーン印刷またはバッド印刷等により形成する。また、必要に応じてこのように形成された複数のキートップをゴムカバー基材、ポリエチル製バネなどに接着配列し、携帯電話機他のキーボード部分に組み込まれて使用される。

【0004】

【発明が解決しようとする課題】 しかしながら、上述した従来のキートップにあっては、キートップの裏面に直接印刷するため、スクリーン印刷法またはバッド印刷法が行なわれていた。しかしながら、このスクリーン印刷法、バッド印刷法では、印刷意匠を印刷色に応じて版下と呼ばれるデザイン画を作り、さらにこれをスクリーン版或いは凹版などを製作する必要があり、しかも文字、数字、符号などの記号（以下記号という）に応じた形状の印刷版を1色毎に用いるため、多色印刷の場合は使用する色数と同じ回数印刷しなければならないし、手間がかかる割りには意匠性にも乏しく、高解像度の鮮明な写真、イラスト、絵などの印刷は事実上不可能である。また小ロット多品種印刷の場合は、製版費用がコスト高となるし、手数もかかり納期も長くなるし、デザイン変更に手間がかかるという問題があった。さらには透明キートップの裏面に印刷があるために、透明キートップの厚みが厚いと携帯電話機他のキーボード部分に組み込まれた時に印刷の位置が奥になってしまい、外光が届きにくく、反射光で見たときには暗いくすんだ色に見えてしまって視認性の悪いものになってしまい欠点があつ

た。また、例えば1mm以下の厚みの薄いキートップであれば視認性は損なわれないものの、薄いキートップ自体の成形が難しく、工業的には生産性の悪いコスト高のものとなってしまうという欠点があった。

【0005】本発明は、これら従来の問題点を排除しようとするもので、押釦スイッチ用部材の表示部のデザインにコンピューターを用いたデザインデータが使用でき、デザイン変更、修正も簡単で、しかも無版印刷なので、製版にかかるコストもなく簡易に多種情報に適応でき、従来のスクリーン印刷等では不可能であった意匠性の高い押釦スイッチ用部材とし、さらには該印刷層の下面に光反射率50%以上の光反射性遮光層をもうけ、外光による視認性の向上と鮮やかな色の発色とを得られる高品位の押釦スイッチ部材およびその製造方法を提供しようとするものである。

【0006】

【課題を解決するための手段】上記目的を達成するためこの発明は、透光性キートップと、透光性ゴムカバー基材との間に接着剤を介して表示部のある印刷シートを介在配備した押釦スイッチ用部材であって、印刷シートは透明樹脂シートの一面にインク受容層を形成して、該インク受容層に複数色、例えばシアン、マゼンダ、イエローの3色の微小ドットを用いて光透過性の色彩、図柄、記号からなる表示部を有するグラフィック印刷層を設け、該印刷層の下面に光反射率50%以上の光反射性遮光層を設けて押釦スイッチ用部材とした。(請求項1)

【0007】そして、この発明にかかる押釦スイッチ用部材とするのに、透光性キートップと、透光性ゴムカバー基材との間に透明または半透明接着剤を介して表示部のある印刷シートを介在配備して押釦スイッチ用部材とするのに、キートップ成形工程により透明または半透明の熱可塑性或いは熱硬化性樹脂で前記キートップを成形すると共に、透光性樹脂シートの片面にインク受容層を形成し、該インク受容層にシアン、マゼンダ、イエローの複数色の微小ドットを用いて光透過性の表示部を有するグラフィック印刷層をプリンタにより形成する印刷層形成工程と、該印刷層の下面に光反射率50%以上の光反射性遮光層を設けた遮光層形成工程と、或いは該遮光層形成工程及び半透明白色層形成工程とを経て印刷シートを製作し、該印刷シートの上面に前記キートップ成形工程で製作したキートップを接着するキートップ接着工程と、印刷シートの下面に透明または半透明の接着剤を介して透光性ゴムカバー基材を接着するゴムカバー基材接着工程とを経て、押釦スイッチ用部材とするものである。(請求項2乃至請求項6)

【0008】前記キートップとしては、アクリルポリマー、ポリカーボネートポリマー、スチレンポリマーおよびその変性ポリマーなどの熱可塑性樹脂を用いて、射出成形、トランスファー成形などの成形装置で成形するか、或いは、アクリル樹脂、不飽和ポリエステル樹脂、

ジアリルフタレート樹脂、スチレン系樹脂、ウレタン系樹脂、シリコーン系樹脂およびその混合物、変性樹脂などの熱硬化性樹脂を用いて射出成形、注型成形装置で成形される透明または半透明のキートップとしたものであって、前記印刷シートと透明接着剤、例えばアクリル系接着剤、ポリエステル系接着剤、ウレタン系接着剤など、或いは熱硬化型接着剤、UV硬化型接着剤、溶剤型接着剤など透明な接着剤を用いて固着一体化している。さらに、印刷シートにおいては印刷層を形成する樹脂シートとして、ポリカーボネート系、ポリエステル系、アクリルポリマー系などの透光性樹脂シートが用いられ、これにインク受容層を形成して昇華型熱転写方式或いはトナー電子方式、静電画像方式、レーザー露光熱現像転写方式、インクジェット方式、熱転写方式、加熱発色方式のいずれか少なくとも1種類のプリンタを用いて、例えばシアン、マゼンダ、イエローの3種類等の複数色の微小ドットで光透過性の色彩、図柄、記号からなる表示部を有するグラフィック印刷層が形成されるものである。即ち、前記透光性樹脂シートは、熱可塑性樹脂シートを用いるが、非晶性の熱可塑性樹脂、結晶性の熱可塑性樹脂またはこれらの共重合体若しくは混合物からなるものでもよい。具体的にはポリエチレンテレフタレート、ポリエチレンナフタレート、ポリカーボネート、ポリプロピレン、ポリアクリル酸エステル、ポリスチレン、ポリ塩化ビニル等が例示され、無色透明或いは有色透明もしくは半透明の樹脂シートを用いる。なお、この樹脂シートは、印刷適性等の観点からポリエステル系、ポリカーボネート系、ポリアクリル系の10μm～500μmの厚みのものを選択するのがよい。さらにこの樹脂シートには、印刷層が形成されるのであるが、印刷方法の適性に応じて、印刷インクの受容層、たとえば昇華型熱転写印刷ならば、塩化ビニル酢酸ビニル系またはポリエステル系のコーティング層を形成しておけばよく、インクジェット印刷ならば水溶性のインクを固着させるための吸水層を形成しておけばよい。更に、密着性を改善するためにコロナ放電、プラズマ処理、UV(紫外線照射)処理、プライマー処理等を施すことは任意である。

【0009】この表示部は、昇華型、インクジェット型、転写型、電子写真型などのプリンタで印刷するので、多彩な色、パターン、記号、図柄などが例えばシアン、マゼンダ、イエローの3色の微小ドットを用いてカラー印刷として一度に行われる。即ち、従来のスクリーン印刷などの手法にみられるようないわゆる多色刷りの際の重ねた層構成という概念ではなく、例えば昇華型であれば、透明樹脂シートの裏に施されたインク受容層のごく薄いインク吸収層に直径0.01mmから0.2mm程度の微小ドット単位で全色が一度に印刷される。インクジェット型そのほかの方式においても同様である。印刷インクは強い隠蔽性を持つ濃度の濃いインクではなく、さ

らにドット単位の印刷であるので、この印刷層に印刷された記号、図柄などは（たとえ黒色であっても）厳密にいうと、すべて透光性であると言える。しかも、例えば3原色ドット単位でプリンタで印刷するので、一般的には微妙な中間調の色表現、グラデーション、写真、グラフィックデザインなどの印刷が可能である。この3原色はシアン、マゼンダ、イエロー（以下CMY系という）が用いられ、さらには黒を強調するためにブラックが追加されること（以下CMYK系という）もある。たとえば3原色それが256階調の濃度を表現すれば、CMY系の3つの微小ドットで256階調の3乗である16777216色の実質的なフルカラー表現が可能となり、また、3原色としてはRGB系（レッド、グリーン、ブルー）という定義方法で印刷することもできる。

【0010】またさらに、印刷層の形成工程では、コンピューターデザイン方法を用いたカラーデザインデータを昇華型熱転写方式などのプリンタに供給し、これをCMY系、またはCMYK系インクによって3色または数色の微少ドットを用いて、透明または半透明の熱可塑性樹脂シートに、実質的なフルカラー印刷を行い、次にこの印刷された樹脂シートの下面に所定の抜き記号、図柄形状のある或いはその他の光反射率50%以上の光反射性遮光層を印刷、コーティング、ラミネート、ホットスタンプ、蒸着、スッパッタリング、メッキなどの方法を用いて印刷シートを構成するか、さらに該光反射性遮光層の下面に半透明白色層を印刷、コーティング、ラミネートなどの方法で形成したのち、該印刷シートの所定の位置に前記キートップ及び透光性ゴムカバー基材を透明接着剤を介して固着一体化させるものである。

【0011】なお、前記透光性樹脂シートにある印刷層は、インク受容層として存在するが、実際のインクはインク受容層の中に微小ドット単位で着色されているので文字、記号だけでなく、複雑なグラフィックパターンや写真などを表現することも可能である。そして、該印刷層は光を通す微小ドット印刷なので、外光は印刷層の下の光反射性遮光層で反射され、鮮やかな、視認性の高い印刷品位とすることができます。このとき光反射性遮光層が蒸着、スッパッタリングなどによって金属被膜とされれば、メタリック感を持つ鮮やかな印刷品位となる。さらには、光反射性遮光層を所定の形状の抜き文字、抜き記号、抜き模様などに形成しておけば、下からの透過光によっても抜き文字が視認できる、いわゆる文字照光を形成することが可能である。このときに光反射性遮光層より抜かれた文字、記号、模様などは外光を反射する層がなくなるので、外光での視認性は若干劣ることになるが、これを補うために光反射性遮光層の下面に半透明白色層を形成すれば視認性をさらに高めることができるものである。前記印刷シートは、その構成が、透明熱可塑性樹脂シートと、印刷層と、遮光性抜き文字層などの光反射性遮光層とを有する少なくとも3層構造の印刷

シートとなっている。また、この印刷シートのサイズは、キートップの底面と同様の大きさとすればよいが、図にも示したようにキートップの底面よりも少し大きくておいて鍔状に構成してもよく、このようにすることによって、押釦スイッチ用部材が外装ケースに組み込まれたときに、この印刷シートによりキートップ抜け防止、および後述の文字照光の場合において確実な光漏れ防止也可能となる。

【0012】さらに、光反射性遮光層を全面に形成すれば透過光を通さない、外光の反射光によって鮮やかな視認性の高いキーになるし、光反射性遮光層に所定の文字、記号、模様などの抜き形状部分を形成すれば、外光反射光の良好な視認性とともに抜き形状部分は下に配置された発光源からの透過光を通すことができる、いわゆる文字照光として機能する。さらには光反射性遮光層の裏面に半透明白色層を配置すれば、この文字照光は半透明白色層によって外光の反射光での視認性も良好に維持しつつ、文字照光としても十分に機能するものとなる。

【0013】また、意匠に着目すれば、光反射性遮光層を銀箔や銀色のインクで構成すれば、全体が銀色に輝くメタリック調の意匠となるし、その銀箔に対応した位置の着色層が赤色であればレッドメタリックに、グレーであればダークメタリックに、黄色であれば金色に、7色のグラデーションであれば輝く虹のようにすることが可能であり、加飾の応用範囲が幅広くデザインできる。この光反射性遮光層は銀色に限ったことではなく、高輝度の白色、蛍光色、パール色など多彩なものを選択することが可能である。

【0014】なお、前記印刷層に付設される光反射性遮光層としては、金属薄膜（アルミ、クロム、金、銀、銅など）を熱転写、ホットスタンプ、メッキ、蒸着、スッパッタリングなどの手法によって所定の抜き文字、記号、図柄など所定抜き形状に形成する。または、光反射性遮光インク（金属系顔料、白顔料、蛍光染料、パール顔料、雲母粉などが高充填されている実質的に光を反射し、光を通さないインク）をスクリーン印刷、転写印刷などの手法により、所望の図柄形状等に形成してもよい。特に金属薄膜またはメタリック印刷を用いるとメタリック調の特殊な反射光意匠表現が可能になる。また、

文字照光機能を使わずに光反射性遮光層を利用して外光による反射光の高輝度な視認性やメタリック意匠表現だけがほしいのであれば、抜き文字、抜き図柄などにせず全面に金属薄膜や光反射性遮光シートをラミネートする方法とすることも可能である。好適例としては、アルミ蒸着膜または光反射性遮光インクを前記印刷層の印刷と同様に熱転写式のプリンタで行うのがよく、この場合、印刷パターンはコンピュータ上で任意のパターンを簡単に作ることができるし、印刷コストも低減化できる。

【0015】このようなソフトウェアを用いてコンピュータ上で作られたデザインは、斬新なデザインとすること

とができる。たとえば、高画質の風景写真、人物写真を取り入れることも可能であるし、精密な幾何学模様を描くこともできる。また色数も実質的に制限がないので記号、幾何学模様毎に単一色ではなく、徐々に色が変化するグラデーションなどの手法も可能となる。このことによって、キートップのデザイン自由度が増し、多様化するデザインニーズ、電子機器の外観上の付加価値向上に柔軟に対応できる。

【0016】なお、前記印刷シートにおいて遮光層を光反射率50%以上の光反射性遮光層とするのは以下の理由による。すなわち印刷機によって形成された複数色の微小ドットを用いた光透過性の色彩、図柄、記号からなる表示部を有するグラフィック印刷層は、光を透過しやすい着色であり、外光に対しての反射率が低いため、特に押釦スイッチのキートップの裏面に配置され、電子機器の外装ケースなどに覆われた状態では、外光が少なく、暗く、明度の低い視認性の悪いものとなってしまう。特に光反射率が45%以下であると鮮やかさがなく、読み取りづらいか読み取れなくなるので、そこで本発明では、該印刷層の下側に光反射率50%以上の光反射性遮光層を設けることによってこの問題を解決している。つまり外から入った光は透明キートップと印刷層を通過して、印刷層の下側の光反射率50%以上の光反射性遮光層で反射され、この光が使用者の目に見えて、結果として印刷層が高輝度の明度の高い明るい、視認性の良いものとなって見えるわけである。この結果、電子機器の外装ケースなどに組み込まれた押釦スイッチであっても、少量の外光ではっきりと印刷が見える視認性豊かな、実用性の高いものとすることができます。

【0017】つぎに印刷シートの光反射性遮光層下側に半透明白色層をもうけるのは以下の理由による。つまり光反射性遮光層を部分的に形成し、いわゆる抜き文字形状などとした場合、抜き文字に当たる部分は、下に配置された光源からの光で透過光を通して見るとき、すなわち文字照光として見る場合は優れたものであるが、下の光源を消灯したときには上記の理由で、外光反射が少ないため視認性の劣るものとなってしまうので、この下に配置された光源を消灯したときの視認性を補うものとして、半透明白色層が有効に機能するのである。言い換えると半透明白色層は半透明であることによって文字照光の時の下からの光を通し、かつ白色であることによって抜き文字部分の明度を補い外光による視認性も高める効果がある。半透明白色層の材質としてはポリエチレン、ポリプロピレン、ポリエチレン、アクリル、ポリカーボネートなどの半透明白色に着色された樹脂シートや、半透明白色に着色された印刷インクなどが用いられ、これらの厚みは半透明であることを考慮し、0.01mmから1mm程度とするのが良い。形成方法としては樹脂シートであればラミネートして一体化するのが簡便であるし、インク状態であれば印刷、コーティング、塗装などの方

法が採用される。

【0018】以上のような理由から、本発明のキートップに用いられる印刷シートは、透光性樹脂シートと、印刷層と、光反射性遮光層とを有する3層構造か、或いは透光性樹脂シートと、印刷層と、光反射性遮光層と、半透明白色層とを有する4層構造のシートとするのであるが、その構成順序は、キートップが形成される側から見て、印刷層の下側に光反射性遮光層が必要である。この場合、印刷シートとしてみると、上から透光性樹脂シート、印刷層、光反射性遮光層、半透明白色層という順序とするか或いは、印刷層、透光性樹脂シート、光反射性遮光層、半透明白色層という順序の場合などが考えられるが、この順序に関しては製造工程の都合などから任意に選択できる。

【0019】ここで、半透明白色層は、インク印刷、コーティング、塗装、ラミネート、ホットスタンプなどの方法で形成されるが、樹脂シートの片面全体に施されるので工業的には簡単で安価に連続的に形成することが可能である。例えば、コーティングならば白色インクをバーコータやダイコータで高速塗布することが可能であり、またホットスタンプならば白色を必要な部分にだけ、1秒程度の時間で任意にスタンプして形成することができる。

【0020】さらに印刷シートの構成と意匠について詳しく説明すると、例えば、前記印刷層のキー全体に青色で着色が施されており、その一部に茶色の文字が形成されているとする。この印刷層の裏面に光反射性遮光層として、茶色い文字の部分だけ抜き文字形状となっている反射率85%のアルミ蒸着膜が配置されており、さらにこの光反射性遮光層の裏面に半透明白色の樹脂シートがラミネートされているとする。キー全体の青色の部分はアルミ蒸着膜の光反射によって少量の外光でも容易に視認できる明度の高いブルーメタリック系の色として認識できるし、その中の茶色い文字も半透明白色層の光散乱効果によって見やすい明るい茶色の文字になっている。さらには、下側からの光に対しては半透明白色の樹脂シートを通して茶色い文字だけが照光され、文字照光となり視認性の高いものとなる。

【0021】この例では、光反射性遮光層を単なるアルミ蒸着膜としたが、このアルミ蒸着膜にホログラム装飾を施しておけば、立体的に浮き上がるデザインとすることも可能であるし、ヘアラインなどの細かな金属加工模様を附加することも可能であるし、着色層を青色でなく黄色とすればアルミ蒸着箔の固有色である銀色と相まって、金色と視認される。もちろんこのようにして得られた反射率の高い印刷シートは透明キートップに接着されて、携帯電話やオーディオ機器などの電子機器に組み込まれても多くの反射光を発するため、薄暗い部屋、夕方や日陰の屋外などの少々暗い場所であっても鮮やかで、視認性の高い印刷となっており、誤操作などによる不具

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合も防止できる実用上有用なキーボードとすることができる。

【0022】さらには、本発明で用いられる光反射性遮光層は、印刷層の印刷記号（例えば文字）と同じ輪郭形状で形成する必要はなく、例えば印刷の記号と別パターンの抜き文字遮光層を形成しておけば、この抜き文字パターンは反射光で見たときはほとんど視認されず、透過光が入ったときだけ浮かび上がる、一種の透かし文字としてデザインすることも可能である。このようにして準備された印刷シートの印刷表示部に対応した位置にキートップを接着剤、例えば透明なウレタン系、エポキシ系、アクリル系、ポリエステル系、シリコーン系などの透明または半透明接着剤を用いて接着固定化し、さらに印刷層の表示部に対応した所定の位置にゴムカバー基材に固定して押釦スイッチ用部材とするのである。

【0023】

【作用】この発明にかかる押釦スイッチ用部材は、記号などの表示部が形成された印刷層を有する印刷シートと、該表示部に対応した位置に設けた透明熱可塑性樹脂或いは透明硬化性樹脂からなるキートップと、透光性ゴムカバー基材とを備えたものであって、前記印刷シートの構成が、透光性樹脂シートの一面にインク受容層を形成して、該インク受容層に少なくともシアン、マゼンダ、イエローの複数色の微小ドットを用いて光透過性の色彩、図柄、記号からなる表示部を有するグラフィック印刷層を設け、該印刷層の下面に所定の抜き記号、図柄形状のある光反射率50%以上の光反射性遮光層を設けたことを特徴とし、樹脂シートに印刷表示部をプリンタにより形成したので、多種意匠形成情報に適応でき、高精細、高精度なフルカラーの小ロット多品種に適した優れたキートップを含む押釦スイッチ用部材とことができ、しかも印刷層の裏面に光反射性遮光層が形成されることによって、明度、彩度ともに良好な視認性に優れた表示部が形成され、またメタリック、ホログラム、実写写真、コンピュータグラフィックス（CG）などを多用した特殊装飾にも簡単に対応でき、ユーザーアビール力の高い商品デザインとすることができる。なお、印刷部分は透明キートップで被覆されるため、使用に際して印刷表示部が磨耗することなく、表示部に優れた耐久性、すなわち、長期にわたって優れた視認性が保持される。

【0024】また、この発明にかかる押釦スイッチ用部材の製造方法は、コンピュータ上でデザインした意匠が、製版などの工程を経ずに印刷表示部に反映でき、高画質印刷が得られ、しかも印刷は透光性樹脂シートに形成するので、成形品などに印刷する場合に比べ簡単で安価に制作することができ、白色または銀色の着色層も工業的に容易に形成できる。すなわち多量品、小ロット品に関わらずその製造コストを大幅に削減できる。

【0025】

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【発明の実施の形態】以下、この発明の実施の形態を図面を用いて説明する。図1はこの発明の一つの実施形態を示し、押釦スイッチ用部材10は透光性キートップ1と、透光性ゴムカバー基材2との間に透明または半透明接着剤3、9を介して樹脂シート4に表示部のある印刷層5と所定の抜き記号のある光反射性遮光層7とを有する印刷シート45を配備した構成としてある。そして、図2および図3に示すように透明または半透明の熱可塑性或いは熱硬化性樹脂で前記キートップ1を成形金型30で成形するキートップ成形工程11を有し、また、透明樹脂シート4の片面にインク受容層を形成し、該インク受容層に記号、図柄、色彩からなる表示部を複数色の微小ドットを用いてオリジナルデザイン入力機器21を含むプリンタ20により印刷して印刷層5とする印刷層形成工程12と、前記印刷層5に印刷された記号、図柄形状に対応して抜き形状6のある光反射性遮光層7を印刷層5の下面に形成する光反射性遮光層形成工程13とを経て、該光反射性遮光層7の下面に半透明白色層8を形成して印刷シート45とする工程とを有し、該印刷シート45の上面に前記キートップ成形工程11で製作したキートップ1を接着するのに、精密ディスペンサで接着剤3を塗布し、紫外線照射手段40で固着一体化するキートップ接着工程14と、印刷シート45の下面に透明または半透明の接着剤9によって透光性ゴムカバー基材2を接着するゴムカバー基材接着工程16とから押釦スイッチ用部材10が製造される。

【0026】この場合、前記印刷層5を含む印刷シート45の構成が、上から透明樹脂シート4、印刷層5、抜き形状6を有する光反射性遮光層7、半透明白色層8の順序になっているが、本発明の他の形態のように、印刷シート45の構成が上から、印刷層5、樹脂シート4、抜き形状6を有する光反射性遮光層7、半透明白色層8の順にしてもよい。いずれの場合も、印刷層5は、デザインデータに応じて、記号、写真、幾何学模様などがフルカラーで印刷されており、その視認性を高めるために印刷層5の下側に光反射性遮光層7が形成される。また文字のみをバックライトで照光する場合は、抜き文字形状の光反射性遮光層とすればよい。

【0027】前記光反射性遮光層形成工程13としては、光反射率50%以上の金属薄膜をラミネート、熱転写、ホットスタンプ、蒸着、イオンプレーティングまたはスッパッタリングの手法或いは光反射率50%以上の光反射性インクによるメタリック印刷手法、塗装、コーティングなどによって所定の抜き記号、図柄などの形状を有する光反射性遮光層7を形成するものであって、さらに該光反射性遮光層7に半透明白色層8を重合形成することもできる。

【0028】また、前記ゴムカバー基材接着工程16には、前記印刷層5上に接着した各キートップ毎に炭酸ガスレーザー50により切断するキートップ切断工程15

と、該キートップ切断工程15により個々に切断されたキートップ1を透明または半透明の粘着両面テープの接着剤9により透光性シリコンゴムで成形されたゴムカバー基材2に接着する工程をも含む。もちろんキートップ切断工程15は炭酸ガスレーザーに限定されるものではなく、打ち抜き刃による抜き加工とすることも可能であるし、キートップ1を張り付ける前に印刷シート45を予めここに切断しておいても良い。また、図2(a)に示したキートップ成形工程11は熱硬化製樹脂を用いた注型成形であるが、熱可塑性樹脂の場合は一般的には射出成形法が用いられる。

【0029】なお、前記押釦スイッチ用部材10の透明キートップ1に対応したゴムカバー基材2の裏側に必要に応じ補強フィルムを接着することもできる。また、図示を省略するが、押釦スイッチ用部材10は、クリック板等を介して回路基板と組み付けられて携帯電話機等のケーシング内に収容され、透明キートップ1の先端部分がケーシング外へ押圧操作可能に突出し、また、押圧操作でクリック板のドーム部を押圧してドーム部の可動接点を回路基板の固定接点に接触させ、回路を開閉するようにして用いることもできる。

【0030】前記印刷層5のデザイン例では、キーの機能に応じた記号等が配置され印刷されているものであるが、実際には写真、CG、高精度幾何学模様など自由に配置できる。また、文字照光とする場合でも、印刷層の裏側に光反射性遮光層7が形成されるので、従来のように文字の外周を暗色系の黒色などにする必要はなく自由な着色のデザインが可能である。たとえば文字の外周をぐく薄い色に着色し、抜き文字にする文字をこれよりも濃い色としても、外周部分の裏側には遮光層が形成されるので下からの光に対しては文字の部分だけが透過する文字照光とすることができる。また光反射性遮光層7の抜き形状6は必ずしも印刷層5の文字形状と同じにしなくともよく、たとえば抜き形状6を一回り大きめの形状としたり、細かな網目状にすることも可能であり様々なデザインに対応できる。

【0031】次に、この発明の製造方法では、熱可塑性樹脂製の樹脂シート4に必要であれば、印刷用の下地処理を行う。例示すると密着性向上のためのプラズマ処理、コロナ放電、プライマー処理等を行い、次にプリンタ20のインクを付着させるためのインク受容層、インク吸収層またはインク接着層などをコーティングする。次にこの樹脂シート4にプリンタ20でキーボードに用いる所定の記号などの印刷層5を印刷すると共に、抜き形状6のある光反射性遮光層7を設けたもの、或いはさらにこれに半透明白色層8を形成して印刷シート45とし、該印刷シート45の上に透明の接着剤3を介して透明キートップ1を接着一体化し、また印刷シート45の下にゴムカバー基材2を接着剤9で一体固定化して押釦スイッチ用部材10とする。(図1)前記

半透明白色層8は、印刷、ホットスタンプ、コーティングなどの方法で形成しても良いし、白色のシートを用意してこれをラミネートしても良い。

【0032】そして、前記キートップ1は、樹脂材料を用いインジェクション成形、注型成形などで成形するが、前述の印刷シート45を接着する都合上、キートップ1の裏側、すなわち、印刷シート45を接着する面はできるだけ平らな面であることが望ましい。このように準備された透明キートップ1を前述の印刷シート45の所定の位置に透明接着剤3を介して固定し、さらにゴムカバー基材2上に接着して押釦スイッチ用部材10を得る。この押釦スイッチ用部材10は、回路基板に組み付けられてスイッチを構成、すなわち、携帯電話機等のケーシング内に回路基板と組み付けられて収容され、電話番号入力等に用いる押釦スイッチを構成する。

【0033】上述したように、この実施の形態は、多彩なデザイン印刷が簡単に実現でき、光反射性遮光層によって、夕方や曇天の屋外、薄暗い部屋、ケースの奥まった位置に配置されたキーボードなどでも視認性が大幅に向上し、明度、彩度も高く、しかも、構造が簡単に押釦スイッチ用部材が成形できる。このため、意匠性に富んだキートップを含む押釦スイッチ用部材の製造コストを低減でき、また、照光式または反射式の押釦スイッチ用部材も安価に製造でき、小ロット多品種製造であってもコストを増大させることなく柔軟に対応できる。そして、製造された押釦スイッチ用部材は、印刷表示部がキートップ裏面に一体化され、表示部の視認性にも優れ、表示部磨耗も生じることがなく、高い耐久性が得られる。

【0034】文字照光の場合は下側に配置された光源からの光が光反射性遮光層7の抜き形状6を通して視認できるので、その部分の印刷層5は明度、彩度ともにあかるく良好な視認性となるが、光源の光が常時点灯でない場合、光源の光を消灯した場合は逆に光反射性遮光層7がないので若干視認性の劣ったものになる。これを解決するために半透明白色層8が形成される。半透明白色層8は半透明なので下側に配置された光源が点灯しているときは、その光が通過し文字照光としての機能を損なうことがないし、白色に着色してあるので印刷層5に形成された色の明度を上げて、光源が消灯しているときの視認性も高めることができる。その構成方法は、半透明白色の樹脂シートをラミネートするか、或いは半透明白インクを用いて印刷するなどであるが、前者なら半透明白のポリエチレンシート、ポリカーボネートシート、アクリルシートなどの5~500μm厚みのものが選択される。後者であれば白インクを用いてスクリーン印刷などの方法で形成される。

【0035】透明または半透明接着剤9としては、透光性ゴムカバー基材2と接着させるためのもので、本来、接着剤であればどのようなものでも使用可能であり、さ

らに照光キータイプとしないものであれば不透明な有色の接着剤であっても良いが、実施例ではアクリル系粘着剤を使用した両面テープを用い、接着剤のはみ出し、たれ、むらがなく、最近の薄型化された機器の中では障害とならないように配慮してあって、高品位な接着とすることができる。

【0036】前記ゴムカバー基材2としては、キートップ1を複数個配置してゴムカバー基材2の所定の位置に接着する。このゴムカバー基材2は、シリコーンゴム製カバー基材、EPDM製カバー基材、熱可塑性エラストマー製カバー基材などが用いられるが、特にシリコーンゴム製カバー基材を選ぶ場合は、接着信頼性をあげるためにシリコーンゴムの表面処理を行うことが望ましい。表面処理としてはコロナ放電、UV洗浄、EB照射、火炎処理、カップリング剤またはプライマー塗布などが用いられる。本発明の形態ではシリコーンゴムの表面をUV洗浄処理した後にシランカップリング剤を塗布して接着力を増している。

【0037】図4の実施形態では、キートップ1とゴムカバー基材2との間に配備される印刷シート4.5が樹脂シート4、印刷層5および抜き形状6のある光反射性遮光層7からなり、接着剤3および両面接着シートの接着剤9で接着一体化されたものである。

【0038】図5の実施形態では、図1の例の変形例で、印刷シート4.5の光反射性遮光層7が部分的に配置したもので、銀箔などを用いれば反射光で見ると部分メタリックとして視認され、透過光で見れば逆に光反射性遮光層7の部分だけ光を通さず外周照光キーとして使用できるものである。

【0039】

【実施例】次に、この発明の実施例を説明する。

実施例1

縦横各6mm×8mmで高さ2mmの透明キートップを三菱化成（株）製の熱可塑性ポリカーボネート樹脂（商品名：NOVAREX 7020 IR）を用いて通常のインジェクション成形法で100個成形した。また、印刷シートとして、セイコーホーリン（株）製のカラーレーザープリンターLP-8000Cを用いて125μmの透明PETシートに所定の印刷パターンを印刷層として形成した。この印刷は3原色カラートナーを用いたドット単位のグラフィックで記号、色彩、図柄などが印

刷されている。次に、この印刷シートの印刷面にアルミ金属を使って真空蒸着手法を用いて光反射性遮光層を形成した。このときアルミ蒸着層の厚みを30Åから300Åまで変化させ、結果として表1に示すように光反射性遮光層の光反射率を30%から90%まで変化させたものを5種類準備した。つぎに、大日本インキ化学工業（株）製のUV接着剤（商品名：ユニディックV-4221）に硬化剤としてチバガイキー製イルガキュア#184を2、4部配合した接着剤で、前記キートップの裏側と印刷シートのPETシート側（印刷されていない側）とを接着した。（接着条件：高圧水銀塔80W/cm、距離10cmで10秒照射）このようにして、印刷シート付きキートップを製作した。また、一方、ゴムカバー基材として、信越化学工業（株）製のシリコーンゴムKE-151uに同社の加硫剤C-8Aを0.8部加えた材料を用いて加熱圧縮成形により15個分のキートップを配置できる透光性ゴムカバー基材を成形した。次にこのゴムカバー基材の接着表面を波長185nmと254nm、出力40WのUV照射装置を使って約1分間の照射を行い、接着表面を清浄にしたのち、この接着面にリンテック（株）製の粘着テープ（商品名：ダックライナーTL-250）を接着面とほぼ同様の形状に切り抜いたものを貼着して、前記印刷シート付きキートップを接着一体化し押し釦スイッチ用部材の成形品を得た。このようにして得られた押し釦スイッチ用部材を携帯電話のケースに組み込んで室内の明るさ（600ルクス）において測定器：（株）トブコン製BM-7でキー部分の照度測定をして視認性を評価したところ表1のようになった。このようにして得られた番号3、4、5の成形品は、透明キートップを通して印刷シートの印刷が鮮やかに視認でき、さらにはこの印刷がドット単位の細やかなグラフィカルな絵柄印刷であるため、スクリーン印刷とは違う精緻で実質的に無限色の写真に近い品質のものであり、高品位なものとなっている。また携帯電話などのケースに組み込んで少量の外光で反射して見やすい品位の高いものであった。これに比較して番号1、2の成形品は十分な外からの光をあてれば見えるものの、携帯電話にケースに組み込んだときに外光が足りず、とくに読みとりづらい鮮明度に欠ける印刷視認性となつた。

【0040】

【表1】

15
反射性遮光層の視認性

16

番号	反射性遮光層 アルミ蒸着厚み	光反射率	照度測定結果		視認性評価結果
1	30Å	30%	0.5cd/m ² 以下	×	明度が低く数字が読みとれない
2	80Å	45%	0.8cd/m ²	×	見えるものの鮮やかでなく読みとりづらい
3	100Å	50%	1.0cd/m ²	○	ケースに組まれた状態でも良好に見える
4	150Å	70%	2.0cd/m ²	○	細かな色も判別でき鮮やかに見える
5	300Å	90%	3.0cd/m ²	○	メタリックが強調され鮮やかである

【0041】実施例2

縦横幅6mm×8mmで高さ2mmの透明キートップを三井化学（株）製の熱硬化性不飽和ポリエステル系樹脂（商品名：エスターC755-1）を用いて、硬化剤として日本油脂（株）製のバーへキサ3Mを1%配合し、注型加熱成形（170°C5分）によって15個成形した。また、印刷シートとして、日本ピクター（株）製の昇華型熱転写カラープリンターTruePrint3500を用いて125μmの透明PETシートに所定の印刷バターンを印刷した。この印刷はCMYKカラー昇華インクを用いたドット単位のグラフィックで記号、図柄などが印刷されている。次に、印刷シートの印刷面に光反射性遮光層として所定の抜き部分を持つ印刷を日本ピクター（株）製の昇華型熱転写カラープリンターTruePrint3500で、アルミ蒸着箔（日本ピクター（株）製商品名：プラチナシルバーインクJP-T3201）を所定のバターンに熱転写印刷を施した。このときの光反射性遮光層の反射率は60%であった。そしてこの抜き文字部分を持つ光反射性遮光層を印刷した側に半透明白色層として東レ（株）製の白色PETシート、商品名ルミラーX-20（50μm）を全面にアクリル系接着剤を介して圧着ラミネートした。さらに、ノガワケミカル（株）製のUV接着剤（商品名：ダイアボンドUV-147）で前記キートップの裏側と、印刷シートのPETシート側（印刷されていない側）とを接着した。（接着条件：高圧水銀灯80W/cm、距離15cmで30秒照射）このようにして、全部で15個の印刷シート付きキートップを作成した。また一方、ゴムカバー基材として、信越化学工業（株）製のシリコーンゴムKE-151uに同社の加硫剤C-8Aを0.8部配合した材料を用いて加熱圧縮成形により15個分のキートップを配置できる透光性ゴムカバー基材を成形した。次にこのゴムカバー基材の接着表面を波長185nmと254nm、出力40WのUV照射装置を使って約1分間の照射を行い、接着表面を清浄にしたのち、この接着面に信越化学工業（株）製のプライマーKE-1800Cを少量塗布して風乾させた。次で、日立化成ポリマー（株）製の粘着テープ（商品名：ハイポン11-58

3）を接着面とほぼ同様の形状に切り抜いたものを用いて、印刷シート付きキートップとゴムカバー基材とを接着し、さらに接着性を高めるため乾燥機で100°C30分の加熱を行い押釦スイッチ用部材の成形品を得た。このようにして得られた成形品は、透明キートップを通して印刷シートの印刷が鮮やかに視認でき、さらにはこの印刷がドット単位の細やかなグラフィカルな絵柄印刷であるため、スクリーン印刷とは違う精緻で実質的に無限色の写真に近い品質のものであり、高品位なものとなっている。そしてその裏面に配置してあるアルミ蒸着箔の光反射性遮光層によって、これらの印刷は輝くメタリックとなっているし、抜き文字形状が形成されているので裏面からの照明を受けたときにも、光が部分的、選択的に透過し、透過光による抜き文字、抜き記号などのバターンが明快に視認できる視認性良好な成形品になっている。

実施例3

30 縦横幅6mm×8mmで高さ2mmの透明キートップを三菱化成（株）製の熱可塑性ポリカーボネート樹脂（商品名：NOVAREX 7020 IR）を用いて通常のインジェクション成形法で15個成形した。また、印刷シートとして、日本ピクター（株）製の昇華型熱転写カラープリンターTruePrint3500を用いて200μmの透明PETシートに所定の印刷バターンを印刷層として成形した。この印刷はCMY系カラー昇華インクで記号、図柄などが印刷されている。次に、印刷シートの印刷面に光反射性遮光層として反射率55%のリンテック（株）製のルミクール1015フィルムをアクリル系粘着剤を用いてラミネートし一体に形成した。さらに、大日本インキ化学工業（株）製のUV接着剤（商品名：ユニディックV-4221）に硬化剤としてチバガイキー製のイルガキュアー#184を3.0部配合した接着剤で、前記キートップの裏側と印刷シートのPETシート側（印刷されていない側）とを接着した。（接着条件：高圧水銀塔80W/cm、距離10cmで10秒照射）このようにして、全部で15個印刷シート付きキートップを作成した。また、一方、ゴムカバー基材として、信越化学工業（株）製のシリコーンゴムKE

－151uに同社の加硫剤C－8Aを1.0部配合した材料を用いて、加熱圧縮成形で15個分のキートップを配置できる透光性ゴムカバー基材を成形した。次にこのゴムカバー基材の接着表面を波長185nmと254nm、出力40WのUV照射装置を使って約1.5分間の照射を行い、接着表面を清浄にしたのち、この接着面にリンテック(株)製の粘着テープ(商品名:ダックライナーTL-250)を接着面とほぼ同様の形状に切り抜いたものを貼着して前記印刷シート付きキートップを接着一体化し押釦スイッチ用部材の成形品を得た。このようにして得られた成形品は、透明キートップを通して印刷シートの印刷が視認でき、さらにはこの印刷がスクリーン印刷とは違う精緻で写真に近い品質のものであり、高品位なものとなっている。そしてその裏面に配置してある光反射性遮光層によって、裏面からの照明を受けたときにも、光が遮光層の周囲の透過光によるパターンで明快に視認できる視認性良好な成形品になっている。

【0042】

【発明の効果】本発明では、キートップの表示部のデザインにコンピュータを用いたデザインデータが使用でき、デザイン変更、修正が簡単で、しかも無版印刷なので、製版にかかるコストもなく印刷速度、制度が著しく良好で、簡易に多種意匠形成情報に適応でき、従来のスクリーン印刷やバッド印刷では不可能であった意匠性の高い押釦スイッチ用部材とすることができますと共に、印刷層の色そのものは淡い中間色も可能で微小ドット色を用いてドット単位の印刷方法とすれば、実質的にフルカラーの表現が可能あり、光反射性遮光層はこれとは別に形成するので、例えばアルミ蒸着箔の遮光層や白顔料を高充填した濃い白の反射率の高い遮光層を形成でき、これによってフルカラー印刷層の表現を損なうことのないデザイン性豊かな印刷が保てるし、さらに光反射性遮光層が50%以上の光反射率を持つことによって視認性が大幅に向上し、明度、彩度も高く、しかも、鮮明な写真、イラスト、絵などの高画質の再現が可能で色数にも制限がないため、意匠性に富んだ押釦スイッチ用部材にでき、その製造コストをも低減できるほか、デザインの自由度が増し、従来方式ではえられない斬新なデザインとすることができます、小ロット多品種製造であってもコストを増大させることなく柔軟に対応できる。そして、製造された押釦スイッチ用部材は、印刷表示部が透明キー樹脂部裏面に一体化され、表示部の視認性にも優れ、表示部磨耗も生じることがなく、高い耐久性が得られるも

のである。さらに、押釦スイッチの表示部の光反射性遮光層の抜き形状の輪郭と、印刷層の文字パターンなどの印刷の輪郭を合わせておけば、文字照光タイプが得られるし、印刷層のパターンと違う抜き文字パターンを作つておけば、反射光でキーを見たときと、透過光でキーを見たときにはそれぞれ違った表示部が視認できる構成とすることも可能で、デザイン性に富んだ多彩な押釦スイッチ用部材とすることができます、また印刷は透光性樹脂シートに形成するので、成形品などに印刷する場合に比べ簡単に大量に安価に制作することができ生産性の大幅な向上を図れるほか、多量品、小ロット品に関わらずその製造コストを大幅に削減できる。

【図面の簡単な説明】

【図1】本発明の実施の形態にかかる押釦スイッチ用部材の拡大縦断面図である。

【図2】本発明の製造工程の一部の概要を示し、(a)はキートップ成形工程、(b)は印刷層形成工程を示す。

【図3】この発明の製造工程の概要をアルファベット順に示す模式図である。

【図4】この発明の他の実施形態の拡大縦断面図である。

【図5】この発明のさらに他の実施形態の拡大縦断面図である。

【符号の説明】

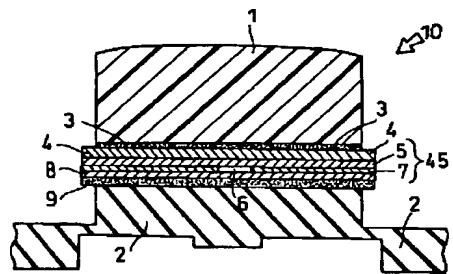
1	キートップ
2	ゴムカバー基材
3	接着剤
4	樹脂シート
5	印刷層
6	抜き形状
7	光反射性遮光層
8	半透明白色層
9	接着剤
10	押釦スイッチ用部材
11	キートップ成形工程
12	印刷層形成工程
13	光反射性遮光層形成工程
14	キートップ接着工程
15	キートップ切断工程
16	ゴムカバー基材接着工程
45	印刷シート

20

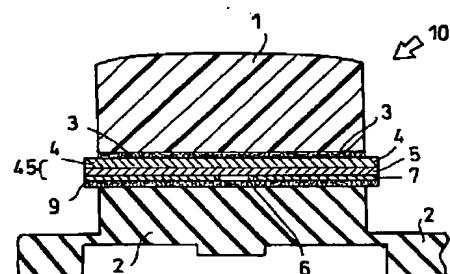
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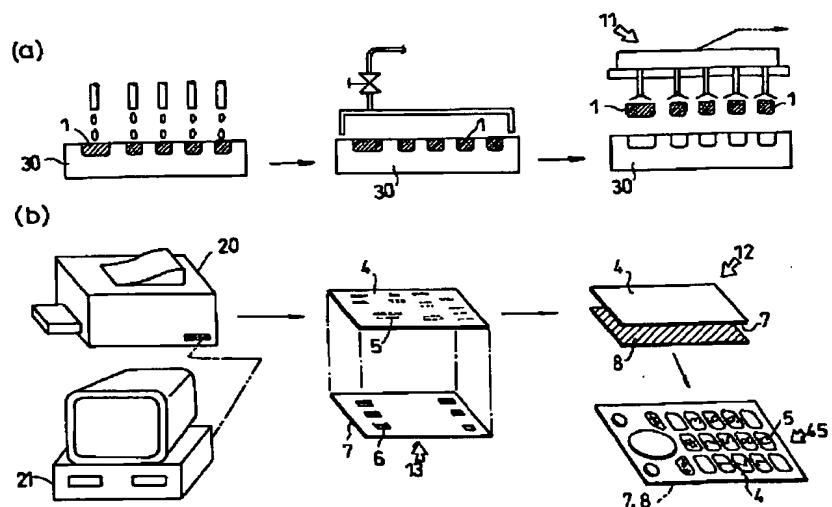
【図1】



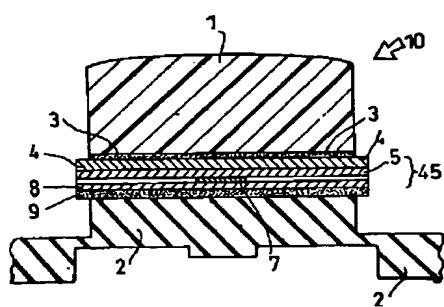
【図4】



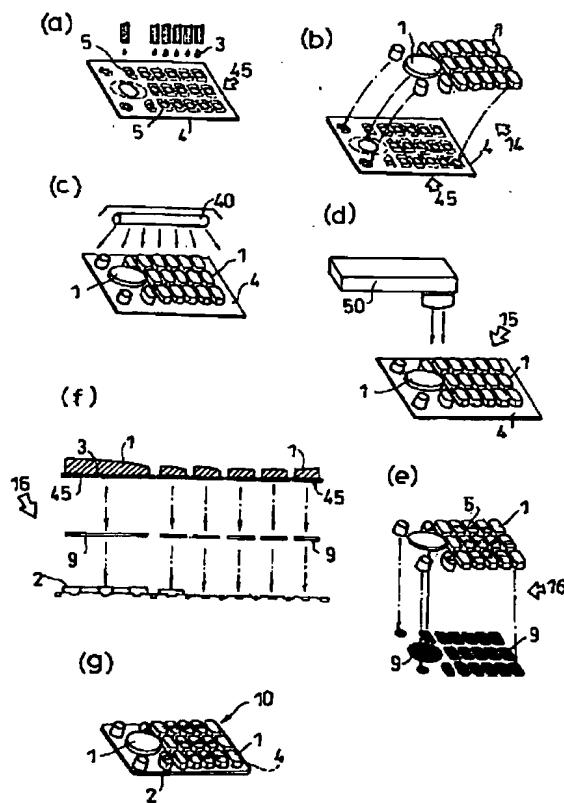
【図2】



【図5】



【図3】



フロントページの続き

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